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Stress Management and Mindfulness as an Integrative Pillar of Lifestyle Medicine

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Psychological Stress: A Major Modifiable Determinant of Health

Psychological stress is an intrinsic component of human life, and acute stress responses represent adaptive physiological mechanisms that facilitate rapid responses to physical and psychological challenges. However, when stress becomes persistent, excessive, or inadequately regulated, these same biological mechanisms may contribute to negative health outcomes.
Within Lifestyle Medicine, stress management is a clinically relevant behavioural domain that interacts with nutrition, physical activity, sleep, social connection, and avoidance of harmful substances.
Mindfulness-based approaches are among the most extensively studied strategies for stress management in this context.

The Biology of the Stress Response

The acute stress response is mediated by two coupled systems. The sympathetic-adrenomedullary axis releases catecholamines within seconds, raising heart rate, cardiac output and vascular tone. The hypothalamic-pituitary-adrenal axis releases cortisol over minutes to hours, mobilising glucose and modulating the inflammatory response. Both are self-limiting through negative feedback at hippocampal and prefrontal glucocorticoid receptors.
Chronicity changes the picture. Repeated or unresolved activation produces allostatic load, the cumulative physiological cost of adaptation. Prolonged cortisol exposure can reduce glucocorticoid receptor sensitivity in immune cells, weakening the normal anti-inflammatory brake and contributing to persistently elevated levels of interleukin-6 and C-reactive protein. Parasympathetic withdrawal, measurable as reduced heart rate variability, accompanies this and may reflect diminished prefrontal inhibitory control over the amygdala.
The cardiovascular route is now partly understood. In a longitudinal study of 293 adults without known cardiovascular disease, resting amygdalar metabolic activity predicted subsequent cardiovascular events (standardised hazard ratio 1.59, 95% CI 1.27 to 1.98), an association mediated in series by increased bone-marrow haematopoietic activity and arterial inflammation.
Mindfulness is hypothesised to act upstream of this cascade, by changing appraisal and reactivity rather than suppressing the response itself.
In a randomised trial of 35 high-stress unemployed adults, mindfulness training compared with relaxation increased resting connectivity between the default mode network and the left dorsolateral prefrontal cortex, and this change statistically accounted for part of the reduction in interleukin-6.
The sample is small and the finding awaits replication, providing a cautious summary of the current state of mechanistic evidence.

Mindfulness and Stress Management: Scientific Rationale

Mindfulness is generally defined as the capacity to intentionally attend to what is happening in the present moment with openness and without judgment, increasing awareness of thoughts, emotions, bodily sensations, and environmental stimuli without automatically reacting to them.

One of the best-known clinical applications is Mindfulness-Based Stress Reduction (MBSR), developed by Jon Kabat-Zinn in the late 1970s at the University of Massachusetts Medical Center. The original eight-week program combines formal mindfulness meditation, the body scan, mindful movement, and daily home practice.

The clinical rationale for mindfulness is based on the hypothesis that training attention and reducing automatic reactivity may influence responses to stressful situations.

Mindfulness may therefore function as a form of stress-response modulation rather than simply promoting relaxation.

Proposed mechanisms include improved attentional regulation, reduced emotional reactivity, greater awareness of bodily signals, changes in cognitive appraisal, and reduced repetitive negative thinking.

Mindfulness as an Evidence-Based Intervention

The scientific literature on mindfulness has expanded substantially over the past two decades, with randomized controlled trials, systematic reviews, and meta-analyses evaluating its effects across diverse healthy and clinical populations.

A landmark systematic review and meta-analysis published in JAMA Internal Medicine included 47 randomized clinical trials involving 3,515 participants.

Mindfulness meditation programs produced small to moderate improvements in anxiety, depressive symptoms, and pain, whereas evidence for stress/distress and mental health-related quality of life was more limited. Importantly, mindfulness was not shown to be superior to active interventions such as exercise or behavioural therapies.

Mindfulness should therefore be considered one evidence-based option within a broader therapeutic repertoire rather than a universally superior approach.

A subsequent systematic review and meta-analysis of 142 randomized clinical trials involving more than 12,000 participants reported improvements in symptoms across several psychiatric conditions, although effects varied according to diagnosis and comparator.

Evidence also suggests modest effects on cortisol, a biological marker related to stress regulation: a meta-analysis of 58 studies involving 3,508 participants found that stress-management interventions, including mindfulness, relaxation, mind-body approaches, and talking therapies, were associated with modest reductions in cortisol compared with control conditions.

Mindfulness and Cardiovascular Health

A scientific statement from the American Heart Association concluded that meditation may have potential cardiovascular benefits, but evidence remains insufficient to support its use as a stand-alone treatment for cardiovascular disease.

A systematic review and meta-analysis of meditation, Mindfulness-Based Stress Reduction, and relaxation techniques in patients with cardiovascular disease reported potential reductions in blood pressure but also highlighted limitations in the available evidence.

Accordingly, mindfulness should not be expected to independently normalize hypertension, reverse insulin resistance, or prevent cardiovascular events.

Its potential value within Lifestyle Medicine is rather as a complementary strategy that may support stress regulation, emotional well-being, self-awareness, treatment adherence, and health-related behaviours.

Lifestyle Medicine and the Integration of Mindfulness

Because health behaviours are interconnected, the reverse is also true: improvements in one behavioural domain may in turn influence others: physical activity can be associated with reduced perceived stress and improve mood, adequate sleep supports emotional regulation, healthy nutrition promotes metabolic stability, and social connection can help buffer psychological stress.
Within this framework, mindfulness may support behavioural change by increasing awareness of internal states and potentially creating a pause between triggers and automatic responses. Its flexibility also facilitates integration into everyday life, through both formal practices such as mindfulness meditation, mindful breathing, body scanning, and mindful movement, and informal practice during routine activities.

Clinical Assessment and Stress-Management Prescription

Stress management should be approached as a clinical intervention rather than as generic advice to “relax”. Initial assessment should explore sources and perceived burden of stress, coping strategies, sleep, physical activity, nutrition, social relationships, occupational environment, substance use, and relevant psychological symptoms.
Clinicians should distinguish transient situational stress from persistent psychological distress that may require further assessment, including symptoms of anxiety, depression, burnout, insomnia, trauma-related symptoms, or functional impairment when clinically indicated.
Once the stress profile has been established, intervention should be individualized. Mindfulness does not necessarily require a formal eight-week MBSR program; brief daily practices may be an appropriate starting point for some individuals, whereas others may benefit from structured mindfulness-based programs delivered by qualified professionals.

A Practical Mindfulness Prescription

A simple mindfulness prescription can include five components:
Frequency: daily practice is generally preferable to occasional longer sessions.
Duration: initial sessions may be brief, for example 5 to 10 minutes, with progressive increases according to tolerance and preference.
Type: mindful breathing, body scan, seated meditation, mindful walking, mindful movement, or mindful eating can be selected according to the patient's needs and preferences.
Context: practice should be attached to an existing routine whenever possible, such as after waking, before lunch, or before bedtime.
Progression: duration and complexity can increase gradually, while informal mindfulness can be introduced into daily activities.
The objective is sustainable adherence rather than perfection.

Applying Lifestyle Medicine in Clinical Practice: A Clinical Case Study

In clinical practice Mindfulness can be integrated with other clinical interventions, and may serve as a complementary approach to standard care or, in some conditions, as part of a structured therapeutic intervention.
It can help support self-regulation and may promote healthy behaviour.
The central principle is to pause between the trigger and response, bringing awareness to thoughts and emotions and creating an opportunity for a more skilful and less reactive response.
There are numerous examples of clinical scenarios in daily clinical practice; a few examples include palpitations, anxiety, irritable bowel syndrome (IBS), chronic pain syndrome and headache, dysfunctional breathing, insomnia and burnout, etc., following appropriate medical assessment and exclusion of relevant organic causes.
<u>Analysis of a clinical situation:</u>

A 35-year-old woman with recurrent abdominal pain, bloating and altered bowel habit for several years. Multiple investigations have been reassuring, but symptoms are recurrent and become particularly troublesome during periods of stress.
The issue here is:
Stress and worry may increase attention to abdominal sensations and amplify symptom perception and distress, contributing to the complex bidirectional processes of the gut -brain axis.
In IBS, guidelines recommend brain-gut behaviour therapies; IBS-specific cognitive behavioural therapy and gut-directed hypnotherapy currently have the largest evidence base, and mindfulness-based approaches can be considered within this broader group.
How can mindfulness help (Mindfulness-Based Cognitive Therapy (MBCT) or Mindfulness-Based Interventions (MBI))?
During an episode:

1. Pause: this is an important step in responding to any stressful episode. Simply notice the abdominal sensation.
2. Take gentle breaths.
3. Notice the thoughts and emotions associated with it, such as worry, fear or frustration.
4. Allow these thoughts and emotions to be there without judging them or getting caught up in them.
5. Return to the present-moment experience.

Explanation of this scenario:
We cannot always control our thoughts and emotions in any situation, but we may be able to develop greater awareness of how we respond to them.
Mindfulness can teach us to pause, respond to sensations with more clarity, and may help reduce anxiety and symptom-related distress and promote a less reactive response to symptoms.
The same framework may be applied across different situations although the clinical approach and evidence base may vary according to the condition.

Challenges and Limitations

Despite growing evidence, mindfulness research presents important methodological challenges. Blinding is generally impossible in behavioural interventions, increasing the potential for expectancy and performance effects.
Studies also vary substantially in intervention characteristics and outcomes, limiting direct comparisons.
A further concern is the risk of excessive medicalization of stress. Mindfulness should not be presented as a universal solution or imply that individuals are solely responsible for adapting to unhealthy circumstances. Occupational overload, financial insecurity, social isolation, caregiving responsibilities, discrimination, and other structural determinants may represent major sources of chronic stress that require environmental, social, or organizational interventions.
A patient-centred approach should therefore distinguish modifiable individual behaviours from stressors requiring broader interventions. Mindfulness may improve coping and self-regulation but should not be used to normalize persistently harmful circumstances.
Similarly, clinically significant anxiety, depression, trauma-related symptoms, severe insomnia, or other mental health disorders require appropriate professional assessment and evidence-based treatment, with mindfulness considered a potential complement rather than a replacement.

Future Perspectives

Future research should move beyond short-term symptom reduction toward clinically meaningful long-term outcomes. Key questions include whether sustained mindfulness practice can contribute to adherence to physical activity, healthy eating, sleep, smoking cessation, and other Lifestyle Medicine behaviours.

Another promising direction is the integration of mindfulness into personalized Lifestyle Medicine programs. Rather than applying identical interventions to all patients, clinicians could identify the predominant behavioural pathways through which stress may affect health and tailor interventions accordingly.

Conclusions

Psychological stress is an important and modifiable determinant of health, influencing physiological regulation, behaviour, recovery, and the ability to maintain healthy lifestyle patterns. Within Lifestyle Medicine, stress management should therefore be considered an integral component of preventive and supportive care.
The potential value of mindfulness within Lifestyle Medicine may therefore lie in its integration with other evidence-based approaches, including physical activity, healthy nutrition, restorative sleep, social connection, avoidance of harmful substances, and patient-centred behaviour change.
The goal is not to eliminate stress, but to strengthen resilience, self-awareness, recovery, and behavioural flexibility.

Key Take-Home Messages

• Chronic psychological stress is an important modifiable determinant of health and interacts with biological, behavioural, and social pathways.
• Stress management should be considered an integral component of Lifestyle Medicine.
• Mindfulness involves present-moment, non-judgmental awareness and can be cultivated through formal meditation as well as ordinary daily activities.
• Mindfulness-based interventions can produce small improvements for psychological outcomes, particularly perceived stress, anxiety and depressive symptoms.
• Evidence for cardiovascular, inflammatory outcomes is promising but heterogeneous and should be interpreted cautiously.
• Mindfulness should complement, rather than replace, established medical treatments and other Lifestyle Medicine interventions, within a personalized and integrated approach.

REFERENCES

1. Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. Clin Psychol Sci Pract. 2003;10(2):144-156. https://doi.org/10.1093/clipsy.bpg016
2. Goyal M, Singh S, Sibinga EMS, Gould NF, Rowland-Seymour A, Sharma R, et al. Meditation programs for psychological stress and well-being: a systematic review and meta-analysis. JAMA Intern Med. 2014;174(3):357-368. https://doi.org/10.1001/jamainternmed.2013.13018
3. Goldberg SB, Tucker RP, Greene PA, Davidson RJ, Wampold BE, Kearney DJ, et al. Mindfulness-based interventions for psychiatric disorders: a systematic review and meta-analysis. Clin Psychol Rev. 2018; 59:52-60. https://doi.org/10.1016/j.cpr.2017.10.011
4. Levine GN, Lange RA, Bairey-Merz CN, Davidson RJ, Jamerson K, Mehta PK, et al. Meditation and cardiovascular risk reduction: a scientific statement from the American Heart Association. J Am Heart Assoc. 2017;6(10): e002218. https://doi.org/10.1161/JAHA.117.002218
5. Wankhar D, Prabu Kumar A, Vijayakumar V, et al. Effect of meditation, mindfulness-based stress reduction, and relaxation techniques as mind-body medicine practices to reduce blood pressure in cardiac patients: a systematic review and meta-analysis. Cureus. 2024;16(4): e58434. https://doi.org/10.7759/cureus.58434
6. Grasmann J, Almenräder F, Voracek M, Tran US. Only small effects of mindfulness-based interventions on biomarker levels of inflammation and stress: a preregistered systematic review and two three-level meta-analyses. Int J Mol Sci. 2023;24(5):4445. https://doi.org/10.3390/ijms24054445

7. Rogerson O, Wilding S, Prudenzi A, O'Connor DB. Effectiveness of stress management interventions to change cortisol levels: a systematic review and meta-analysis. Psychoneuroendocrinology. 2024; 159:106415. https://doi.org/10.1016/j.psyneuen.2023.106415
8. Rajan A, Kumar M, Raj P. Effects of mindfulness-based interventions on perceived stress among non-clinical adults: a systematic review and meta-analysis. npj Ment Health Res. 2026; 5:9. https://doi.org/10.1038/s44184-026-00188-4
9. Hilton L, Hempel S, Ewing BA, Apaydin E, Xenakis L, Newberry S, et al. Mindfulness meditation for chronic pain: systematic review and meta-analysis. Ann Behav Med. 2017;51(2):199-213. https://doi.org/10.1007/s12160-016-9844-2
10. Hofmann SG, Sawyer AT, Witt AA, Oh D. The effect of mindfulness-based therapy on anxiety and depression: a meta-analytic review. J Consult Clin Psychol. 2010;78(2):169-183. https://doi.org/10.1037/a0018555
11. McEwen BS. Protective and damaging effects of stress mediators. N Engl J Med. 1998;338(3):171-179. doi:10.1056/NEJM199801153380307 https://doi.org/10.1056/NEJM199801153380307
12. Cohen S, Janicki-Deverts D, Doyle WJ, et al. Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. Proc Natl Acad Sci USA. 2012;109(16):5995-5999. doi: 10.1073/pnas.1118355109 https://doi.org/10.1073/pnas.1118355109
13. Thayer JF, Åhs F, Fredrikson M, Sollers JJ, Wager TD. A meta-analysis of heart rate variability and neuroimaging studies. *Neurosci Biobehav Rev.* 2012;36(2):747-756. doi: 10.1016/j.neubiorev.2011.11.009. https://doi.org/10.1016/j.neubiorev.2011.11.009
14. Tawakol A, Ishai A, Takx RAP, et al. Relation between resting amygdalar activity and cardiovascular events: a longitudinal and cohort study. Lancet. 2017;389(10071):834-845. doi:10.1016/S0140-6736(16)31714-7 https://doi.org/10.1016/S0140-6736(16)31714-7
15. Creswell JD, Taren AA, Lindsay EK, et al. Alterations in resting-state functional connectivity link mindfulness meditation with reduced interleukin-6: a randomized controlled trial. Biol Psychiatry. 2016;80(1):53-61. doi: 10.1016/j.biopsych.2016.01.008 https://doi.org/10.1016/j.biopsych.2016.01.008
16. Lizama-Lefno A, Mojica K, Serrat M, Olivari C, Roco-Videla Á, Flores SV. Mindfulness components and their clinical efficacy: a critical review of an ongoing debate. Healthcare (Basel). 2026;14(2):196. https://doi.org/10.3390/healthcare14020196
17. Black CJ, Thakur ER, Houghton LA, Quigley EMM, Moayyedi P, Ford AC. Efficacy of psychological therapies for irritable bowel syndrome: systematic review and network meta-analysis. Gut. 2020;69(8):1441-1451. https://doi.org/10.1136/gutjnl-2020-321191