

## Supplementary file 1

## Program theories underlying MBPs as mental health and workplace intervention

The term mindfulness can refer to a trait, a state, a practice (including formal mindfulness meditation and informal everyday mindfulness), and an intervention.[1] Mindfulness is most commonly defined as ‘the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment.’[2] As a further refinement of this definition, mindfulness has been conceptualized consisting of two components; the first involving the regulation of attention so that focus is maintained on present external and internal events and experience; the second involving a particular orientation towards these events and experiences, an orientation that is characterized by approach and acceptance rather than withdrawal and avoidance.[3] Mindfulness is typically cultivated in formal and informal practices, where one keeps the focus of attention on the experience of thoughts, emotions, and body sensations and simply observes them as they arise and pass away.

Current theories suggest that mindfulness practices enhance cognitive, emotional, behavioural and physical functioning.[4, 5] Different theories have looked at different, partially overlapping mindfulness mechanisms. A full discussion of all potential mindfulness mechanisms would be beyond the scope of this review. The following mechanisms have been theorized to be involved in enhancing mental health and well-being in MBPs: attention regulation;[1, 3, 4, 6, 7] self-awareness;[1] experiential awareness (leading to disengagement with maladaptive activities of the mind such as rumination, worry, or self-criticism);[8, 9] positive reappraisal;[4] acceptance;[3, 10] exposure and extinction (leading to more adaptive emotional and behavioural fear responses);[1, 4, 6, 10, 11] de-centering/reperceiving/meta-cognition;[1, 3, 4, 6, 8, 10-12] and the cultivation of qualities such as kindness, compassion, joy, and equanimity.[13, 14] Other theories have focused on positive emotions and upward spirals related to awareness and positive reappraisal in mindfulness.[15-17]

Theories of workplace MBPs have linked mindfulness practice to the development of resilience[5, 18] (i.e. the ability to adapt well in the face of stress and adversity[19]). It has been theorized that participants of workplace MBPs learn to perceive adverse workplace events (e.g. layoffs, company politics, abusive supervisor behaviour) as less threatening and recover faster from negative emotions caused by these events.[5] It has further been hypothesized that learning to use approach behaviour (acceptance) as opposed to withdrawal (avoidance) may equip employees to respond to challenges at work more skilfully and less reactively, thereby strengthening both their resilience and their work functioning.[18]

As plausible as these theories sound, how MBPs *actually* yield their beneficial health outcomes is subject of ongoing investigation.[20-22] Many of the above theories are based on the assumption that participants in MBPs really practice mindfulness (i.e., meditate) and that the practice makes a difference. Existing evidence though indicates that the association between mindfulness practice and health outcomes in MBPs is not that straightforward.[23, 24] It is conceivable that other, non-specific factors such as group experience contribute to the program’s salutary effects.[25] There also exist theories on how the workplace setting might negatively impact outcomes of MBPs. It has, for instance, been pointed that group effects may be more complex in the

workplace where people have working relationships than in community settings where individuals are less likely to have pre-existing relationships.[26] It has further been pointed out that mindfulness training in organizations might lead to unintended negative effects, if employees become more perceptive to negative stimuli,[5] if the program's benefits are offset by the addition of training demands to workload[26] or, if the acceptance of adverse events results in general acceptance of mistreatment at work.[5, 27] In summary, while there exist numerous theories on how mindfulness reduces stress and enhances well-being, in how far these theories play out in a real life, particularly in a workplace MBP, is ripe for more rigorous study, hence the need for this realist review

### Overview of most common theories of mindfulness mechanisms related to health and well-being outcomes

Theories of mindfulness mechanisms related to mental health and well-being*	Explanation
Attention regulation[1, 3, 4, 6, 7]	Focus, concentration, changing the focus of attention, stepping out of autopilot
Experiential awareness[8, 9]	Changing the content of the mind (e.g., being aware of breath, body, sounds rather than analysing, judging, planning); disengagement with maladaptive activities of the mind such as rumination, worry, or self-criticism
Self-awareness[1]	Awareness of cognitions, sensations, emotions, interpersonal patterns and dynamics; awareness of stress and unhealthy behaviours
Interoceptive awareness[4]	Awareness of body sensations; embodied awareness of emotions, stress and distress
Positive reappraisal[4]	Stressful events are reconstrued as beneficial, meaningful, benign (one can learn something); positive self-talk
Acceptance[3, 10]	An orientation of the mind that that is characterized by nonjudgmental approach and acceptance rather than by withdrawal, avoidance, or the intent to change something
Exposure and extinction[1, 4, 6, 10, 11]	Exposing oneself to whatever is present in the field of awareness; embodied awareness of reaction to negative events; more adaptive emotional and behavioural fear responses
Decentering/reperceiving/meta-cognitive awareness[1, 3, 4, 6, 8, 10, 11]	The ability to observe things without thinking they actually mean something about yourself
Compassion[7, 13, 14]	An orientation of the mind that recognizes pain and the universality of pain in human experience, capacity to meet that experience with kindness, empathy, equanimity and patience
Kindness[13]	Being curious, friendly and kind toward oneself and one's experiences
Joy[13, 14]	Trembling of the heart in the face of happiness beauty; contentment, wonder, radiant pride, gratitude, delight
Equanimity[13, 14]	Inner balance imbued with awareness, care, and compassion
Relaxation[10]	
Self-regulation[1, 10]	Stepping out of reactive patterns; responding to events rather than reacting
Coping[10]	Self-management skills, reduction of impulsive, maladaptive behaviour
Resilience[5, 18]	Adapt to stress and grow in the face of adversity, cope with workplace stress; employees learn to perceive adverse workplace events (e.g., layoffs, company politics, abusive supervisor behaviour) as less threatening and recover faster from negative emotions caused by these events
Gain spirals[15-17]	Positive emotions (e.g., through awareness and positive reappraisal) creating upward spirals with more more positive emotions

\*These mechanisms are partially interwoven and overlapping.

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