Priming ideas of non-attachment in mindfulness practice alleviates state rumination and increases satisfaction with life

Benjamin Millinson & Thomas Dunn
Bishop Grosseteste University (United Kingdom)

ben.c.o.millinson@outlook.com

ISSN: 2515-138X

Mindfulness-based interventions are known to produce a myriad of effects on psychological and physiological health. A core aspect of mindful thinking is non-attachment, defined as the attenuation of fixation. Influencing cognition has been shown to improve health. This study aimed to examine the effect of priming non-attachment through a brief mindfulness-based intervention. The study included 154 participants recruited using convenience sampling. Measures of state rumination and satisfaction with life were collected before and after a meditative breathing intervention. Participants were randomly assigned to either a non-attachment primer group or a mindful breathing primer group. Primers were administered before the intervention, and non-attachment to the self was measured post-intervention. Results revealed significant decreases in state rumination and increases in satisfaction with life in both primer groups, with the non-attachment primer yielding greater improvements in post-intervention measures. There was a significant interaction between time and condition for state rumination and a near-significant interaction for satisfaction with life. Mindfulness expertise partially moderated these effects.

Keywords: mindfulness; mindfulness-based interventions; non-attachment; psychological well-being; rumination

There has been growth in research into mindfulness within recent decades across multiple domains (van Dam et al., 2018). This growth of attention presents opportunities to further understand the uses of mindfulness, especially use that assists well-being (Amaro, 2015). The philosophy of mindfulness is rooted in Buddhist tradition and is defined as non-judgemental attention to the present moment (Kabat-Zinn, 2004). Incorporated in this way of thinking are the four noble truths (Amaro, 2015): symptom (dissatisfaction); cause (craving); prognosis (ending of dissatisfaction); and treatment (the eightfold path). The philosophy of being present in the moment thus is consistent with the noble truths in that it prevents thoughts of what has happened or what might happen, which means that any unhappiness associated with those thoughts cannot materialise. Within this philosophy, alleviating dissatisfaction involves adopting the "right" view, resolve, speech, conduct, livelihood, effort, mindfulness, and absorption in meditation. Where "right" refers to any form of behaviour that eliminates selfishness, hate, and delusion and therefore suffering. Such an effort is described as wholesome (Monteiro et al., 2015) and is exemplified in kindness, compassion, and non-attachment (Gilpin, 2008). The adoption of behaviour that is "right" diminishes causal influences of dissatisfaction consequently, improving personal welfare.

Mindfulness-based interventions (MBIs) are a medium to develop these wholesome behaviours. Practices that promote well-being align with the concept of wholesomeness, as they reduce suffering (Gold, 2021). As a part of MBIs, one must have an unbiased acknowledgement of experiences and renunciation of their perspectives, with the intent to recognise that reactions to experiences are a concept of the mind (Amaro, 2015; de Zoysa, 2016). Consequently, participation in mindfulness practice is known to promote constructs of well-being, such as patience, kindness, compassion (Amaro, 2015), perception of stress (Hepburn et al., 2021), and reduction of stress (Walsh et al., 2019). These effects have been shown in guided meditations lasting one session (Strohmaier et al., 2021), and in brief sessions lasting as little as five minutes (Howarth et al., 2019). Mindfulness training over longer periods of time significantly improves the likelihood of positive outcomes (Bartlett et al., 2019). Therefore, exercises that enhance mindful ways of thinking are appropriate and can be beneficial for both expert and novice meditators, as shown in Kabat-Zinn's (2011) study of therapeutic use of MBIs in Western society.

Kabat-Zinn's (2011) conceptualisation and Western adoption of mindfulness practices are comprised of implicit manifestation, meaning that the prognosis found within the philosophies of Buddhism and mindfulness is revealed independently. This creates more individualistic and untampered practice, where the mindfulness-based treatment should not be revealed explicitly to the participant, but rather learnt through MBI. The philosophy of mindfulness emphasises a clear route for the alleviation of dissatisfaction (Amaro, 2015), despite this path not being explicitly taught. Consequently, the acceleration of the mechanisms of mindfulness-induced psychological change could be improved with perceptual change.

Research has shown that memory changes the way people interact with their environments (Anderson & Schooler, 1991; Patel, 2012). The ability for information to be coded in memory allows for the transferability of memory in other contexts, indicating that stimuli learned from one environment can be transferred into another (Schacter & Buckner, 1998). This can cause a state of perceptual change that is congruent with a definition of priming (Bruner, 1957). Within this state of perceptual change, the influence of a stimulus encoded into memory alters the perception of another stimulus (Tulving & Schacter, 1990). Consequently, ideas that influence beliefs, thoughts, and opinions affect a person's behaviour in subsequent environments. This is exemplified in research that shows emotional stimuli have the potential to influence positive behaviours (Papies, 2016) such as satisfaction with life (Suh et al., 2008). By outlining possible outcomes manifested through mindfulness practices, a synthesis of preconceived ideas, such as the content within a priming stimulus and environmental context, can increase the chances of desired outcomes (Aarts & Dijksterhuis, 2003). For example, the use of mindfulness and deep breathing priming has been shown to accelerate psychologically desirable consequences within mindfulness practice contexts (Szabo & Kocsis, 2016; Ueberholz & Fiocco, 2022). The mechanisms of priming in mindfulness contexts may be suitably adopted to improve the benefits of MBIs through its potential to improve constructs

concerning mindful ways of thinking. However, there is a lack of research to show the effects of explicit stimuli of mindfulness-pertaining constructs in mindfulness sessions.

A practice thought to encourage more mindful ways of thinking is meditation (Levinson et al., 2014), which is defined as being in a state of awareness, incorporating the ability to observe thoughts, ideas, and emotions whilst being at rest and non-reactive (Adler-Neal & Zeidan, 2017; Sparby & Sacchet, 2022). The idea of being non-reactive, allows oneself to introspect with acceptance. This conduct enables self-knowledge to be learnt, void of hatred, and therefore is wholesome (Gilpin, 2008). Meditation techniques manifest and are classified through the prevalence of body orientation and technique intensity (Matko & Sedlmeier, 2019), making it difficult to define meditation clearly. Rather, meditation can be used as a superordinate construct connoting multiple practices (Matko & Sedlmeier, 2019; Sedlmeier & Srinivas, 2021). Specifically, meditation involves the variability of prominence between the manifestations of mind and body. This is congruent with Buddhist pedagogy that accentuates body and mind as appropriate entities of meditation (Anālayo, 2016). Therefore, while there are various forms of meditative practices, this study focuses specifically on meditative breathing due to its proven positive effects on health and well-being, as well as its emphasis on using the mind-body connection as a central point of meditative focus (Fincham et al., 2023).

Breathing is a fundamental aspect of meditative practice and can be categorised into involuntary and voluntary breathing (Park & Park, 2012). Focusing on voluntary breathing involves observing one's physical and emotional states, enabling the recognition of subjective markers of dissatisfaction (Cebolla et al., 2018). This realisation of one's condition allows for cognitive changes that attenuate negative emotions (Fincham et al., 2023; Nash et al., 2013), reduce mind wandering, and enhance state mindfulness (Levinson et al., 2014).

Furthermore, research has shown that breathwork regulates emotions, decreasing negative emotions while increasing positive ones. This suggests that individuals can view themselves in a way aligned with wholesomeness (Arch & Craske, 2006; Grabovac et al., 2011). The current bodily state influences both neuroanatomy and cognition, which together shape the mind. Consequently, reflecting on one's body, thoughts, and emotions fosters the possibility of identifying dissatisfaction and is supported by mindfulness pedagogy (Anālayo, 2016; Matko & Sedlmeier, 2019).

Non-attachment (NA) is a fundamental concept in mindfulness that plays a crucial role in reducing dissatisfaction and improving well-being (Amaro, 2015). While mindfulness cultivates present-moment awareness, NA involves a deliberate detachment from emotional investment in thoughts, experiences, or desires. NA is not a form of disconnection but rather a reframing of how individuals relate to their emotions and thoughts. It helps practitioners observe experiences without becoming emotionally fixated, thus preventing negative emotions from overwhelming them (Sahdra et al., 2016; Santos & Relojo-Howell, 2020).

Meditative practices, especially breathing exercises, promote NA by reducing attachment to self-focused thoughts (Levinson et al., 2014). By promoting emotional non-reactivity and enhancing introspection, NA helps individuals detach from both the physical world and subjective experiences, minimising emotional investment in self-generated concepts (Sahdra et al., 2016; Pande & Naidu, 1992; Karunamuni & Weerasekera, 2019). This detachment reduces the likelihood of dissatisfaction, as individuals become less preoccupied with emotionally charged beliefs and fixed opinions, thus mitigating negative emotions (Agrawal, 2020; Desbordes et al., 2019; Sahdra et al., 2016).

NA also involves reducing fixation on the self, which is often seen as the focal point of subjective experience (Whitehead et al., 2018; Woźniak, 2018). Understanding that subjective reality is shaped by pre-existing schemas and biases can improve self-awareness, leading to a reframing of how individuals perceive themselves and reality (Pande & Naidu, 1992). Acknowledging the impermanence of mental states, such as the transient nature of thoughts, highlights the constant change inherent in existence, which fosters NA (Hanh, 1998). This perspective helps individuals detach from their mental projections, reducing the mind's propensity to generate dissatisfaction and enhancing psychological well-being (Whitehead et al., 2019b; Soler et al., 2021). Embracing NA thus supports

mindful engagement with the self and the external world, making it a crucial component of mindfulness practice.

Research indicates that diminishing the self occurs through the downregulation of the default mode network (DMN) (Carhart-Harris et al., 2012; Greicius et al., 2003), a process achievable through meditation (Batchelor, 1998; Garrison et al., 2013). When the DMN is less active, preoccupation with the external world and fixed ideas decreases (Carhart-Harris et al., 2013; Josipovic, 2014). This downregulation occurs when individuals engage in task-specific activities, including mindfulness practices (Raichle, 2015; Scheibner et al., 2017). As a result, self-preoccupation decreases, especially among experienced meditators who can reduce their sense of self through DMN modulation (Winter et al., 2020). The positive impact of mindfulness on the DMN suggests its potential to alleviate mental illness (Doucet et al., 2020). Similarly, NA is emphasised in mindful thinking due to its benefits for both physical and psychological health (Tumati et al., 2021). NA mediates improvements in constructs associated with negative affect, including well-being, stress, anxiety, and depression (Ho et al., 2022; Whitehead et al., 2019b), and enhances physical well-being (Pande & Naidu, 1992). Thus, NA contributes to overall well-being by reducing dissatisfaction (Chan, 2008).

Rumination, defined as the repetitive, passive focus on distressing thoughts, is a key contributor to psychological suffering (Nolen-Hoeksema, 1991,2000); this can be observed both as a state and a trait (Marchetti et al., 2018). Self-focused attention of negative emotions perpetuates cycles of dissatisfaction, reinforcing mental distress. From the perspective of Buddhist and mindfulness philosophy, attachment to distressing thoughts is a source of suffering (Agrawal, 2020; Pande & Naidu, 1992). Thus, rumination, in this context, represents a form of attachment to self-referential negative thinking (Teasdale & Chaskalson, 2011). Disrupting this attachment can be pivotal in reducing its impact. Mindfulness and NA practices have been shown to effectively break these cycles. By promoting present-moment awareness and reducing emotional reactivity to thoughts, mindfulness encourages a shift away from ruminative patterns (Burg & Michalak, 2011; Teasdale & Chaskalson, 2011). NA promotes a mindset of detachment from distressing thoughts, allowing individuals to observe them without becoming enmeshed. As such, by fixing the inability to disengage, mindfulness practices alleviate rumination (Koster et al., 2011).

A key mechanism in this reduction of rumination is meditative breathing, which shifts attentional focus to the breath. This practice disrupts negative thought patterns by redirecting attention away from distressing cognitions and diminishing their emotional intensity (Fincham et al., 2023; Levinson et al., 2014). Over time, regular mindfulness practice can enhance NA, allowing individuals to disengage more readily from self-focused thought cycles. Research highlights that individuals with greater mindfulness expertise show significantly lower levels of rumination and are more adept at managing negative emotions through NA (Sahdra et al., 2016). As such, NA is a key psychological construct that directly reduces rumination. By weakening the attachment to distressing thoughts, NA enhances the individual's ability to maintain a calm, detached perspective, thereby alleviating the emotional burden of negative thoughts.

Satisfaction with life (SWL) is a subjective evaluation of one's overall well-being and happiness (Diener & Diener, 1995). NA plays a crucial role in enhancing SWL by fostering a more balanced, less reactive approach to life's challenges (Banth & Talwar, 2012; Pande & Naidu, 1992). Individuals who are less fixated on negative thoughts and emotional experiences are better equipped to maintain emotional equilibrium, which allows for greater adaptability to changing life circumstances. This emotional stability contributes significantly to SWL (Caswell et al., 2022; Zhang et al., 2019).

Mindfulness practices that cultivate NA enable individuals to reassess their life experiences from a more detached, less emotionally charged perspective. This reduced attachment to negative thoughts directly contributes to increased SWL by decreasing the time and mental energy spent on rumination (Gupta & Agrawal, 2022; Kong et al., 2014; Poulin et al., 2008; Wang & Kong, 2020). As such, NA is a vital component to improve SWL within mindfulness intervention frameworks, as less mental fixation on negativity frees individuals to experience greater life satisfaction (Banth & Talwar, 2012; Ho et al., 2022; Montero-Marin et al., 2016; Sahdra et al., 2016;).

Additionally, as individuals disengage from the cycles of rumination, they cultivate a mindset of acceptance and non-reactivity to life's inevitable difficulties. This allows them to approach challenges with greater composure, thereby promoting resilience and increasing SWL. NA reduces the tendency to view life events through a lens of dissatisfaction, replacing it with a more accepting attitude toward both positive and negative experiences (Banth & Talwar, 2012). As such, those who train themselves to think mindfully, have greater dispositional mindfulness and therefore, greater life satisfaction (Li et al., 2022).

The identification of what mindfulness is and what it presents can be recognised through research into the manipulation of concepts that form the basis of its philosophy (de Zoysa, 2016). The influence of ideas of the concepts and mechanisms within mindfulness may have the ability to promote the beneficence of practices. The use of MBIs has been shown to promote a myriad of constructs relating to health and well-being even in brief sessions (Howarth et al., 2019). NA has been shown to increase mindful ways of thinking and improve outcomes of practices (Sahdra et al., 2010). Consequently, ideas of the prognosis of dissatisfaction, namely NA, may promote the psychological constructs that relate to mindful ways of thinking. Specifically, encoding ideas of NA may have the potential to magnify the outcomes of MBIs. In previous studies, the use of priming has shown positive effects for beneficial behaviour transformation (Papies, 2016; Suh et al., 2008). Consequently, priming ideas of NA could potentially accelerate the outcomes of practices. However, little is known regarding the effects of how priming ideas central to mindfulness in practices can affect constructs implicit in mindfulness. This study aims to show the effects of NA priming and mindful breathing priming on NA to the self, rumination, and SWL. It is hypothesised that NA priming will have greater effects on measured outcomes as compared to mindful breathing priming.

METHODS

After data from 61 participants were excluded due to unanswered scale items, the study's sample of 154 participants, with ages ranging from 18 to 52 (*M* = 22.9 years, *SD* = 5.02), remained. Participants were chosen using convenience sampling. This sample consisted of 30 males, with ages ranging from 18-44 (M = 23.5 years, *SD* = 5.16) and 124 females, with ages ranging from 18-52 (*M* = 22.78 years, *SD* = 5). Participants were split into two groups (see Table 1). This study was advertised on Bishop Grosseteste University's SONA system and Facebook.

Table 1
Demographics by primer group

	NAP Group			MBP Group		
Gender	N	Age (M)	Age (SD	N	Age (M)	Age (SD)
Female	61	21.82	3.13	63	23.71	6.18
Male	15	22.53	3.74	15	24.67	6.27

NAP: Non-attachment primer
MBP: Mindful breathing primer

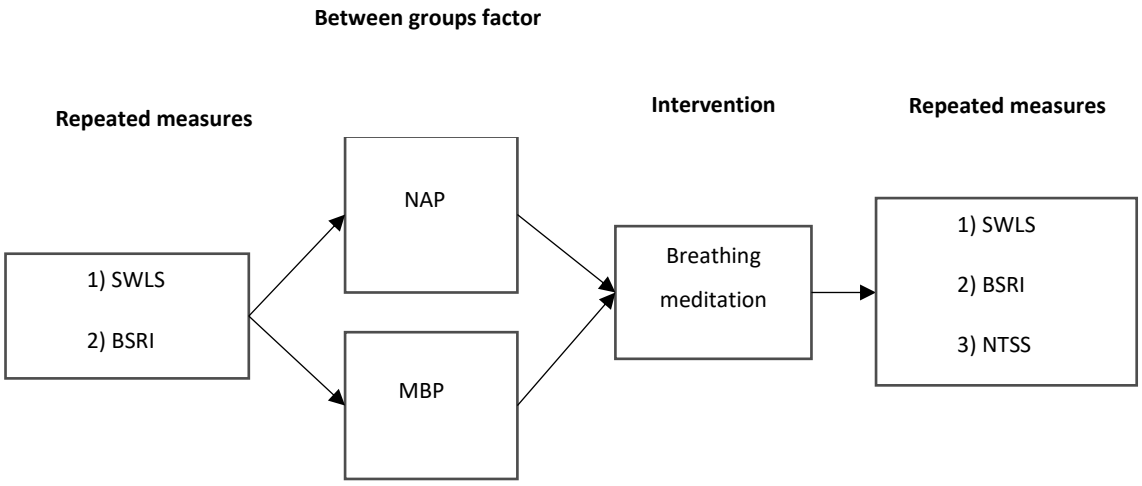
Design

Data was analysed using ANOVAs, t-tests, and moderation analyses. Groups were separated into a NAP group and a MBP group, with both groups being measured before and after a mindfulness intervention as part of ANOVA analyses. An independent t-test analysed non-attachment to the self between primer groups. Post-hoc analyses for changes in life satisfaction and state rumination for each primer group were conducted as was the moderating effect of mindfulness expertise between pre- and post-measures.

Procedure

Using Qualtrics, participants were informed that the study involved ideas of mindfulness on psychological constructs, using a brief mindfulness exercise to reduce the influence of thought that may alter psychometric scores (Higgins et al., 1985; Voicu, 2015). Informed consent was obtained. Participants were then asked to create a 6-digit unique identification number. Participants reported their age, gender, intended device to listen to the audio intervention (earphones/speaker), experience of mindfulness practices, understanding of mindfulness practices and rate of participation in mindfulness practices. Participants then underwent Diener et al.'s (1985) satisfaction with life scale (SWLS) and Marchetti's et al. (2018) brief state rumination inventory (BSRI) immediately after. The SWLS was given before the BSRI to reduce any unwanted priming effects influencing satisfaction with life scores (Higgins et al., 1985; Voicu, 2015). Participants were then randomly split into two groups, a NAP group and a MBP group, where they were exposed to stimuli pertaining to the priming group. Both groups were then involved in a breathing meditation intervention. Once concluded, participants scored themselves against the SWLS, the BSRI and the attachment to self-scale (NTSS) (Whitehead et al., 2018). Non-attachment to the self was not a repeated measure to reduce its influence of ideas of non-attachment on priming groups (Higgins et al., 1985). Upon completion, participants were debriefed. The experiment took on average 10 minutes to complete.

Figure 1
Flowchart showing the process for participants



Materials

SWLS

The SWLS was used to measure life satisfaction. This scale has shown internal reliability in previous research (α = .87) (Diener et al., 1985) and in this study at pre-intervention (α = .86) and post-intervention (α = .89). The scale consists of five items scored on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Sample items include "In most ways my life is close to my ideal", "The conditions of my life are excellent" and "I am satisfied with my life". Higher scores indicated greater life satisfaction.

BSRI

The BSRI was used to measure state rumination. The scale has shown internal consistency in previous research (α = .93 - .95) (Marchetti et al., 2018) and in this study at pre-intervention (α = .90) and post-intervention (α = .91). The scale consists of eight items scored on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Sample items include 'Right now I am reflecting about my mood', 'Right now, I wonder why I react the way I do', and 'Right now, I wonder why I always feel the way I do'. Higher scores indicated greater rates of state rumination.

NTSS

The NTSS was used to measure the absence of fixations of the self. This scale has shown internal consistency in previous research (α = .84) (Whitehead et al., 2018) and in this study (α = .88). The scale consists of 7 items scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Sample items include 'I can let go of unhelpful thoughts about myself', 'I can let go of the need to control my life', and' I don't get too caught up in the thoughts I have about myself'. Higher scores indicated greater non-attachment to the self.

Meditative breathing intervention

The meditative breathing intervention is a 5-minute and 30-second audio clip taken from UCLAhealth.org. A meditative breathing intervention was chosen, as opposed to other types of MBI, as it incorporates the mind-body axis of mindfulness practices (Anālayo, 2016).

NAP

The NAP was formulated to provoke ideas of NA this was done by presenting stimuli that related to lessening fixation, impermanence, and acceptance (Hanh, 1998). The primer was developed to promote conscious thought as NA develops through a conscious process (Sahdra et al., 2016), as a result, it was hypothesised that this prime would affect BSRI and SWLS scores more than the MBP. Participants in the NAP group read the NAP. The primer is as follows:

"Non-attachment is the idea of removing your connection with ideas, values, feelings and yourself. Being attached to ideas, values, feelings and oneself can cause suffering. Negative thoughts may cross your mind, but these need to be met with calm and serenity. Let go of yourself. Remove expectation from your mind and look upon the thoughts in your mind with no connotation or prejudice. Accept that things change. People come and go in and out of our lives, plants die, and you are an ever changing person.

'Detachment is not that you should own nothing, but that nothing should own you' – Ali Ibn Abi Talib."

MBP

The mindful breathing primer was designed to promote an understanding of essential conceptualisations of mindfulness practice. It was formulated to incorporate the mind-body axis of meditation (Anālayo, 2016), as compared to making the theorised prognosis of dissatisfaction explicit (Amaro, 2015). This was done to differentiate any effect from thoughts of NA. Participants in the MBP group read the MBP. The primer is as follows:

"Mindful breathing is an essential aspect of Buddhist meditation. Such an exercise enables the awareness and experience of the mind and how the mind relates to the body. The introspection of one's body allows for a greater understanding of bodily awareness and the interaction between the self and environment. The awareness of mind and body is the virtue of mindful breathing."

RESULTS

Table 2 shows self-reported measures of experience, understanding and participation rate of mindfulness practices by primer group.

Table 2
Demographics of participants experience in mindfulness practices by primer group scored on a 5-point Likert scale.

		NAP group	MBP group
Mindfulness expertise	*M*	7.66	7.77
	SD	2.6	3.02
Experience of mindfulness practices	*M*	2.47	2.42
	SD	.99	1.17
Understanding of mindfulness practices	*M*	2.97	3.12
	SD	1.01	1.13
Participation in mindfulness practices	*M*	2.21	2.23
	SD	.94	1.08

Note: "Mindfulness expertise" refers to a collapsed value constituted of the data from "experience of mindfulness practice", "understanding of mindfulness practices' and 'participation in mindfulness practices".

There was no significant difference in mindfulness expertise between primer groups ($t(152) = 0.25$, $p = .81$). The 76 participants who received the non-attachment prime ($M = 29.76$, $SD = 6.76$) compared to the 78 participants who received the mindful breathing prime ($M = 29.27$, $SD = 8.74$) showed non-significant NTSS scores post-intervention ($t(144.59) = .39$, $p = .35$ (CI = -1.99, 2.99); $d = .06$ (CI = -0.25, 0.38). Levene's test for equality of variances was violated.

There was a significant difference in BSRI scores between groups pre-intervention ($t(152) = -2.43$, $p = .02$, $d = -0.39$ (CI = −0.7, −0.07), and a non-significant difference post-intervention ($t(152) = -1.15$, $p = .25$, $d = 0.19$ (CI = −0.5, 0.13) (see figure 2). There was no significant difference in SWLS between groups pre-intervention ($t(152) = .24$, $p = .81$, $d = 0.04$ (CI = −0.28, 0.35), and post-intervention ($t(152) = -.71$, $p = .48$, $d = 0.11$ (CI = -0.4, 0.2). Table 3 shows BSRI and SWLS scores by group pre- and post-intervention.

Table 3
Means and standard deviations of primer group scores pre- and post-intervention

		BSRI		SWLS	
	Group	M	SD	M	SD
Pre-intervention	NAP	35.91	9.86	21.26	5.98
	MBP	31.87	10.74	21.48	5.77
Post-intervention	NAP	32.51	9.98	23.41	5.95
	MBP	30.63	10.38	22.71	6.35

Table 4 shows ANOVA results within and between subjects by primer group. The assumption of sphericity was not violated. Outputs suggest that the primer group had a statistically significant small difference in effect size for BSRI measures, with time having a significant interaction effect. For SWLS measures, there was a near-significant interaction effect for time and condition with a small effect size.

Table 4
ANOVA results for SWLS and BSRI measures

Measure	*df*	*F*	*p*	Partial Eta Squared
BSRI results by time and condition.				
Time	1	.44	.51	<.01
Condition	1	4	.05	.03
Time * Condition	1	3.65	.05	.02
SWLS results by time and condition.				
Time	1	1.14	.29	.01
Condition	1	.09	.76	<.01
Time * Condition	1	2.94	.09	.02

Post hoc analyses show statistically significant improvements in BSRI and SWLS scores when comparing pre- and post-measures in the NAP group. Additionally, there were significant and near significant improvements in the MBP group, however, with lesser effect sizes, suggesting lesser improvements compared to the NAP group. Effect sizes ranged from small to medium suggesting cognitive and/or physiological differences from priming type (see Table 5).

Table 5
Results of pre/post intervention comparison across groups

Measure	*t*	df	*p*	Cohen's *d* (CI)
NAP Group				
BSRI pre/post	4.01	75	<0.01	0.46(0.22, 0.7)
SWLS pre/post	–4.72	75	<0.01	–0.53(–0.78, –0.3)
MBP Group				
BSRI pre/post	1.55	77	0.13	0.18(–0.05, 0.4)
SWLS pre/post	–3.55	77	<0.01	–0.38(–0.61, 0.15)

Further moderation analyses revealed the moderating effect of mindfulness expertise on the relationship between pre-intervention and post-intervention measures of satisfaction with life and rumination. Table 6 shows a significant interaction term between pre-measures of SWL and mindfulness expertise in the NAP group, but not in the MBP group. There was a non-significant interaction for rumination measures in the NAP group and a near-significant interaction in the MBP group.

Table 6
Moderating Effects of Mindfulness Expertise on the Relationship Between Pre-Intervention and Post-Intervention Psychological Well-being

Measure	ß	SE	CI	*p*
NAP Group				
BSRI post (intercept)	5.69	7.48	–9.22,20.61	0.5
BSRI pre	0.76	0.21	0.33,1.19	<0.01
ME	0.05	0.94	–1.82,1.93	0.95
BSRI pre * ME	–0.01	0.03	–0.06,0.05	0.89
SWLS post (intercept)	–6.52	5.33	–17.14,4.1	0.23
SWLS pre	1.25	0.23	0.8,1.7	<0.01
ME	1.66	0.63	0.4,2.92	0.01
SWLS pre * ME	–0.06	0.03	–0.11,–0.01	0.04
MBP Group				
BSRI post (intercept)	–2.1	6.14	–14.33,10.12	0.73
BSRI pre	1.11	0.18	0.74,1.49	<0.01
ME	1.13	0.8	–0.47,2.73	0.16
BSRI pre * ME	–0.04	0.02	–0.09, 0.01	0.06
SWLS post (intercept)	–2.91	3.47	–9.82, 4	0.4
SWLS pre	1.07	0.16	0.76,1.38	<0.01
ME	0.81	0.44	–0.08,1.71	0.07
SWLS pre * ME	–0.02	0.02	–0.06,0.02	0.27

Note. ME refers to mindfulness expertise

DISCUSSION

The present study shows that non-attachment priming (NAP) and mindful-breathing priming (MBP) had no significant differences between groups on non-attachment to self (NTSS). However, the primary aim of this research was to analyse the effect of NAP on a mindfulness-based intervention (MBI). Congruent with hypotheses, the current study indicates that priming ideas of non-attachment (NA) increases desirable outcomes of MBIs as compared to the control group. There was a significant interaction effect between time and condition in regard to reducing state rumination and a near significant interaction effect between time and condition for improving life satisfaction. Post-hoc t-tests revealed statistically significant changes in state rumination and life satisfaction in the NAP group and a significant change in life satisfaction, as well as a near-significant change in state rumination. Furthermore, moderation analyses revealed that mindfulness expertise have a role to play in the beneficence of mindfulness practices.

Non-attachment

The current study is congruent with past research that shows non-attachment is part of an ongoing process of growth (Donner, 2010), by demonstrating that priming ideas of non-attachment does not affect NTSS scores. The development of non-attachment is seen to occur from introspective reflection on suffering (Whitehead et al., 2019a). The length of the intervention does not allow the opportunity to reflect in-depth on one's suffering and is exemplified in this study by the low effect size between primer groups. Similar is seen in the causal influence that the reframing of perspective has on rates of non-attachment (Pande & Naidu, 1992). Specifically, the length of intervention may not cause an immediate ability to change the attachment to thoughts within the self. This creates the proposition that the improvement of state rumination and life satisfaction from mindfulness practices gradually increases rates of NA (Lam et al., 2023). Despite a lack of significant differences in NTSS scores between groups, priming ideas of NA had significant effects on life satisfaction and state rumination. This is consistent with research by Soler et al. (2021) that highlights the ability of thought to produce satisfaction and is further outlined by Martin (1997).

Rumination

Impaired disengagement, as the cause of rumination, has been seen to improve through MBIs (Koster et al., 2011; Perestelo-Pérez et al., 2017) and is exemplified in this study. Despite there being no significant main effect for time on BSRI scores, the MBP group showed a near-significant reduction in state rumination and the NAP primer showed a significant reduction. Consequently, priming ideas of NA improves state rumination compared to priming ideas of mindful breathing. However, the negligible difference in NTSS scores between groups infers no causal relationship between change in NTSS and state rumination. Specifically, the lack of differences caused by priming groups on NTSS scores does not provoke decreases in state rumination. Therefore, the reduction of state rumination is caused directly by ideas of NA. This is potentially due to the reduction of negative perception (Pande & Naidu, 1992) through the attenuation of subjectivity implicit in rumination (Agrawal, 2020). Consistent with Whitehead et al. (2019a), the fixation of ruminative thought was demonstrated in both primer groups and had a greater effect in the NAP group. MBIs impart a knowledge of a flux state of ruminative thoughts (Frewen et al., 2008), allowing participants of MBI to let go of unwanted thoughts. Thus, ideas of NA can attenuate impaired disengagement and lead to a greater impact on state rumination as compared to ideas of mindful breathing.

Moderation analyses showed that mindfulness expertise did not significantly influence the relationship between pre- and post-rumination scores in the NAP group. There was a near-significant interaction in the MBP group, however, with small beta coefficients suggesting that mindfulness expertise does not influence the relationship between pre- and post-measures. This suggests that rumination reduction may not be caused by the manipulation of non-attachment, but rather by breathing. This idea is congruent with a systematic review from Hopper et al. (2018) which indicated the physiological relationship between breathing and psychological beneficence. Therefore, the reduction of rumination may be associated with the intervention effects on physiological changes, with those higher in mindfulness expertise showing higher sensitivity to mindfulness mechanisms, as suggested by the beta coefficient predicting rumination outcomes from mindfulness expertise in the MBP group. This further indicates that mindful breathing is a potential mechanism of rumination reduction in mindfulness practices (Fincham et al., 2023; Levinson et al., 2014).

Life satisfaction

Priming ideas of NA and mindful breathing improves satisfaction with life (SWL), however, those in the NAP group saw greater improvements as compared to the MBP group. This study's findings are consistent with research that shows SWL being enhanced by NA (Banth & Talwar, 2012; Montero-Marin et al., 2016; Sahdra et al., 2016). However, this study demonstrates that NTS scores do not predict the effect of NA ideas on SWL. The increase of SWL is caused directly by ideas of NA, rather than an effect from NA to the self. This is consistent with research that shows rethinking one's perception improves SWL (Atanes et al., 2015). Consequently, priming ideas of NA positively influences SWL by enabling the relaxation of negative judgement (Gupta & Agrawal, 2022; Ho et al., 2022), and is exemplified in the difference in satisfaction with life scale (Diener & Diener, 1985) (SWLS) scores between primer groups. Ideas of NA enabled the alteration of perception of experiences (Whitehead et al., 2020). By increasing cognitive flexibility, people can reduce the fixations of their thoughts and beliefs, allowing the acceptance of a person's state of mind. This propensity of mindfulness to create plastic cognition and perspective allows for learning from error (Çikrıkci, 2018). Similarly, Kabat-Zinn et al. (1992) proposed that the idea that an individual is not their own manifestations allows them to avoid becoming fixated on one manifestation and, as a result, allows the perceiver to apply multiple perspectives of them. The ensuing cognitive flexibility creates feelings of control. Learning from error involves an introspective process of fixation removal, enabling numerous perceptions of thought and giving the potential for possible paths of action and reasoning (Frewen et al., 2008). Consequently, cognitive flexibility is correlated with SWL by reducing the

influence of negative thought (Ram et al., 2022) and is a potential mechanism of the improvement of SWL.

Moderation analyses further elucidate these ideas. In the NAP group, mindfulness expertise significantly moderates the relationship between pre- and post-intervention satisfaction with life scores, which contrasts with the non-significant interaction term in the MBP group. The small beta coefficient suggests mindfulness expertise does not strongly influence the relationship between measures. However, mindfulness expertise predicted outcomes more strongly than interaction terms. This suggests the alteration of perception is more flexible in those with greater mindfulness expertise which in turn creates more beneficial outcomes and further supports that individuals can better reassess their experiences from a more detached, less emotionally charged perspective.

Holistic mindfulness

The use of priming in MBIs conflicts with the intended conceptualisation and definition of mindfulness. Western acquisition of mindfulness interventions and subsequent change in semantic meaning has confined a definition and compartmentalised from the intended nature of mindfulness (de Zoysa, 2016), as does the explicit use of ideas in practices. MBIs infer that psychological change is from implicit factors and the route for change is individual (Crescentini & Capurso, 2015). The specificity of thought used in this study categorises mindfulness into what it should be rather than what it is. Despite the outcomes conforming to a definition of wholesome, it can be argued that the use of priming in mindfulness contexts conflicts with the holistic nature of mindfulness and Kabat-Zinn's (2011) Western adoption. Therefore, the use of priming in a MBI context may be considered inappropriate.

The use of MBIs, namely meditation and breathwork, has been labelled as a pivotal mental state (Brouwer & Carhart-Harris, 2021; Grof & Grof, 2010; Kuijpers et al., 2007). Interventions that create mindful ways of thinking, such as meditative breathing, can aid psychological transformation through the relaxation of beliefs. This state does not relate to a positive transformation, rather it refers to a change in one's psychology (Pals, 2006), however, mindfulness is a powerful tool for the development of positive psychological and physiological health (Zhang et al., 2021). Encapsulated in this are changes in perception and cognition, which is paramount to mindful ways of thinking (Kang et al., 2013; Rapgay & Bystrisky, 2009). The beneficence derived from mindful practice is developed over time through contemplation (Whitehead et al., 2019a). The study supports the idea that NA priming can be used to promote outcomes of mindfulness through the creation of a pivotal mental state (Montero-Marin et al., 2016), which can expedite the longitudinal enhancement of dispositional mindfulness.

The ability to prime participants alters their mental state to provide a pivotal change in outcome. For example, this study exemplifies the ability of NA to accelerate the psychological transformations found in MBIs by changing the information within a system. Explicitly, those primed with ideas of NA showed increases in desirable outcomes as a result of altered perception and cognition, changing the course and outcomes of MBIs. The use of priming in mindfulness can therefore be described as wholesome, as it attenuates a state of mind that creates suffering (Gold, 2021; Monteiro et al., 2015). Therefore, the prognosis of dissatisfaction can be enhanced by ideas pertaining to NA (Amaro, 2015), with potential suitability in clinical settings (Rybak, 2013), online interventions (Strohmaier et al., 2021; van Emmerik et al., 2018), and to attenuate possible ceiling effects seen in online MBIs (Montero-Marin et al., 2016).

CONCLUSION

The absence of a primer group unrelated to mindfulness creates methodological complications regarding the efficacy of the primer groups used in this study. The existence of primer groups that both pertain to mindfulness may create higher NA to the self, as interventions that involve introspection are thought to develop NA (Thubten, 2009). However, it is unclear from this study's design due to the avoidance of additive NA priming in both groups (Higgins et al., 1985). Specifically,

it cannot be inferred whether both primer groups can enhance levels of NA because NTS was not a repeated measure. To delineate the effects caused by priming ideas of mindfulness and MBIs, future research should employ a primer group irrelevant to mindfulness.

The lack of difference of NA to the self between groups may manifest from the ideas and perspectives that manifested from the NA prime. Despite the improvements in state rumination and life satisfaction, the NA primer may not constitute a true representation of what it means to be unattached. Therefore, using the themes presented by Whitehead et al. (2019a), namely mindful engagement with thought, acceptance of experience, and a feeling of mastery, could encourage feelings of NA. Consequently, priming participants with thoughts of these themes could further change their self-concept and accelerate desired outcomes, producing wholesome behaviours (Gilpin, 2008). As such, future research should employ a similar experimental framework but with differing primers related to mindfulness philosophy.

The lasting effects of priming lack clarity due to the cross-sectional nature of this study. Only the immediate effects of idea priming have been reported in this study, as a result, it is unknown how long these effects last. Thus, further research should utilise a longitudinal design. This would offer the opportunity to discover how well priming constructs of mindfulness are encoded into memory (Buckner & Koutstaal, 1998; Schacter & Buckner, 1998). Additionally, these groups could be subjected to repetitive priming as a possible route for bolstering memory consolidation (Brickman & Stern, 2009). This may promote changes in self-conceptualisation and the psychological constructs influenced by mindful ways of thinking (Crescentini & Capurso, 2015). Similar can be implemented to determine the lasting effect of exposure to the application of one instance of priming stimuli in one intervention. These effects may be altered by the setting of the practice, and as such, further research should strive to provide more ecologically valid settings for mindfulness practices.

The small effect sizes observed within groups for BSRI and SWLS suggest that the cognitive processes underlying mindfulness-based interventions (MBIs) might be influenced by participants' mindsets, ideas, and perceptions. This implies that the benefits of MBIs could be dependent on such cognitive factors. A limitation of this study is the inability to determine whether these processes are primarily psychological or physiological. To address this, future research should incorporate the explicit use of priming stimuli to discern whether MBI outcomes are driven by mental or physical processes, with additional physiological measures. Moreover, further investigation should explore how different types of priming affect the efficacy of MBIs. By designing primers that target specific mechanisms of mindfulness, such as body awareness or present-moment experience, researchers could uncover more nuanced mechanisms contributing to MBI outcomes. The role of mindfulness expertise should be further explored to understand the potential beneficence of priming depending on the rates of mindfulness expertise.

The aforementioned routes for further research could supplement the need for MBIs in clinical environments (Kabat-Zinn, 2003) due to the effect NA has on improving psychopathology (Whitehead et al., 2018). As a result, the use of NA priming in clinical mindfulness sessions may attenuate mental illness. Similarly, the application of MBIs in certain environments has the potential to alter its outcomes (Owens & Bunce, 2022). Thus, the same study can be implemented into an in-person meditative breathing session. For interventions to work, participants need to be immersed (Amaro, 2015). The brief intervention used in this study, despite the improvements in state rumination and life satisfaction, may compress potential effects on outcomes. Therefore, the use of priming shorter interventions could have less efficacy as compared to longer interventions.

Although the sample size in this study was adequate for the analyses conducted, the findings may not be fully generalisable to the broader population. To improve generalisability, future research should use a larger and more diverse sample. Additionally, more detailed descriptive efforts are needed to better understand potential confounding variables that could affect MBI outcomes.

Acknowledgements: None declared
Conflict of interests: None declared
Funding: None declared
Ethical approval: Bishop Grosseteste University

REFERENCES

Aarts, H., & Dijksterhuis, A. (2003). The silence of the library: Environment, situational norm, and social behavior. *Journal of Personality and Social Psychology*, 84(1), 18–28. https://doi.org/10.1037/0022-3514.84.1.18

Adler-Neal, A. L., & Zeidan, F. (2017). Mindfulness meditation for fibromyalgia: Mechanistic and clinical considerations. *Current rheumatology reports*, 19(9), 59. https://doi.org/10.1007/s11926-017-0686-0

Agrawal, J. (2020). Anasakti (non-attachment): An Indian concept for positive mental health. http://dx.doi.org/10.31231/osf.io/4qegh

Amaro, A. (2015). A Holistic Mindfulness. *Mindfulness*, 6(1), 63–73. https://psycnet.apa.org/doi/10.1007/s12671-014-0382-3

Anālayo, B. (2016). Early Buddhist mindfulness and memory, the body, and pain. *Mindfulness*, 7(6), 1271–1280. https://doi.org/10.1007/s12671-016-0573-1

Anderson, J. R., & Schooler, L. J. (1991). Reflections of the environment in memory. *Psychological Science*, 2(6), 396–408. https://doi.org/10.1111/j.1467-9280.1991.tb00174.x

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: emotion regulation following a focused breathing induction. *Behaviour research and therapy*, 44(12), 1849–1858. https://doi.org/10.1016/j.brat.2005.12.007

Atanes, A. C., Andreoni, S., Hirayama, M. S., Montero-Marin, J., Barros, V. V., Ronzani, T. M., Kozasa, E. H., Soler, J., Cebolla, A., Garcia-Campayo, J., & Demarzo, M. M. (2015). Mindfulness, perceived stress, and subjective well-being: a correlational study in primary care health professionals. *BMC complementary and alternative medicine*, 15, 303. https://doi.org/10.1186/s12906-015-0823-0

Banth, S., & Talwar, C. (2012). Anasakti, the Hindu ideal, and its relationship to well-being and orientations to happiness. *Journal of religion and health*, 51(3), 934–946. https://doi.org/10.1007/s10943-010-9402-3

Bartlett, L., Martin, A., Neil, A. L., Memish, K., Otahal, P., Kilpatrick, M., & Sanderson, K. (2019). A systematic review and meta-analysis of workplace mindfulness training randomized controlled trials. *Journal of Occupational Health Psychology*, 24(1), 108–126. https://doi.org/10.1037/ocp0000146

Batchelor, S. (1998) Buddhism without beliefs: A contemporary Guide to awakening, Bloomsbury, London.

Brickman, A. M., & Stern, Y. (2009). Aging and memory in humans. *In Elsevier eBooks*, 175–180. https://doi.org/10.1016/b978-008045046-9.00745-2

Brouwer, A., & Carhart-Harris, R. L. (2021). Pivotal mental states. *Journal of psychopharmacology* (Oxford, England), 35(4), 319–352. https://doi.org/10.1177/0269881120959637

Bruner, J. S. (1957). On perceptual readiness. *Psychological Review*, 64(2), 123–152. https://doi.org/10.1037/h0043805

Buckner, R. L., & Koutstaal, W. (1998). Functional neuroimaging studies of encoding, priming, and explicit memory retrieval. *Proceedings of the National Academy of Sciences of the United States of America*, 95(3), 891–898. https://doi.org/10.1073/pnas.95.3.891

Burg, J. M., & Michalak, J. (2011). The healthy quality of mindful breathing: Associations with rumination and depression. *Cognitive Therapy and Research*, 35(2), 179–185. https://doi.org/10.1007/s10608-010-9343-x

Buttle H. (2015). Measuring a journey without goal: Meditation, spirituality, and physiology. *BioMed research international*, 2015, 891671. https://doi.org/10.1155/2015/891671

Carhart-Harris, R. L., Erritzoe, D., Williams, T., Stone, J. M., Reed, L. J., Colasanti, A., Tyacke, R. J., Leech, R., Malizia, A. L., Murphy, K., Hobden, P., Evans, J., Feilding, A., Wise, R. G., & Nutt, D. J. (2012). Neural correlates of the psychedelic state as determined by fMRI studies with psilocybin. *Proceedings of the National Academy of Sciences of the United States of America*, 109(6), 2138–2143. https://doi.org/10.1073/pnas.1119598109

Carhart-Harris, R. L., Leech, R., Erritzoe, D., Williams, T. M., Stone, J. M., Evans, J., Sharp, D. J., Feilding, A., Wise, R. G., & Nutt, D. J. (2013). Functional connectivity measures after psilocybin

inform a novel hypothesis of early psychosis. *Schizophrenia Bulletin*, 39(6), 1343–1351. https://doi.org/10.1093/schbul/sbs117

Caswell, J. R., Duggirala, A. N., & Verhaeghen, P. (2022). Letting go as an aspect of rumination and its relationship to mindfulness, dysphoria, anxiety, and eudemonic well-being. *Behavioral Sciences* (Basel, Switzerland), 12(10), 369. https://doi.org/10.3390/bs12100369

Cebolla, A., Galiana, L., Campos, D., Oliver, A., Soler, J., Demarzo, M., Baños, R. M., Feliu-Soler, A., & García-Campayo, J. (2018). How does mindfulness work? Exploring a theoretical model using samples of meditators and non-meditators. *Mindfulness*, 9(3), 860–870. https://doi.org/10.1007/s12671-017-0826-7

Chan, W. (2008). Psychological attachment, no-self and Chan Buddhist mind therapy. *Contemporary Buddhism*. 9. 253-264. https://doi.org/10.1080/14639940802556586

Çikrıkci, Ö. (2018). The predictive roles of cognitive flexibility and error oriented motivation skills on life satisfaction. *International Journal of Eurasia Social Sciences*, 9(31), 717-727

Crawley, R. (2015). Trait mindfulness and autobiographical memory specificity. *Cognitive processing*, 16(1), 79–86. https://doi.org/10.1007/s10339-014-0631-3

Crescentini, C., & Capurso, V. (2015). Mindfulness meditation and explicit and implicit indicators of personality and self-concept changes. *Frontiers in Psychology*, 6. https://doi.org/10.3389/fpsyg.2015.00044

de Zoysa, P. (2016). When east meets west: Reflections on the use of Buddhist mindfulness practice in mindfulness-based interventions. *Mental Health, Religion & Culture*, 19(4), 362-370. https://doi.org/10.1080/13674676.2016.1200542

Desbordes, G., Gard, T., Hoge, E., A., Holzel, B., Kerr, C., Lazar, S., Olendzki, A., & Vago, D. (2019). Moving beyond mindfulness: Defining equanimity as an outcome measure in meditation and contemplative research. https://doi.org/10.31231/osf.io/48dgn

Diener, E., & Diener, M. (1995). Cross-cultural correlates of life satisfaction and self-esteem. *Journal of personality and social psychology*, 68(4), 653–663. https://doi.org/10.1037//0022-3514.68.4.653

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71-75

Djernis, D., Lerstrup, I., Poulsen, D., Stigsdotter, U., Dahlgaard, J., & O'Toole, M. (2019). A systematic review and meta-analysis of nature-based mindfulness: Effects of moving mindfulness training into an outdoor natural setting. *International journal of environmental research and public health*, 16(17), 3202

Donner, S. E. (2010). Self or no self: views from self psychology and buddhism in a postmodern context. *Smith College Studies in Social Work*, 80(2-3), 215-227

Doucet, G. E., Janiri, D., Howard, R., O'Brien, M., Andrews-Hanna, J. R., & Frangou, S. (2020). Transdiagnostic and disease-specific abnormalities in the default-mode network hubs in psychiatric disorders: A meta-analysis of resting-state functional imaging studies. *European psychiatry: the journal of the Association of European Psychiatrists*, 63(1), 5. https://doi.org/10.1192/j.eurpsy.2020.57

Fincham, G. W., Strauss, C., Montero-Marin, J., & Cavanagh, K. (2023). Effect of breathwork on stress and mental health: A meta-analysis of randomised-controlled trials. *Scientific reports*, 13(1), 432. https://doi.org/10.1038/s41598-022-27247-y

Frewen, P. A., Evans, E. M., Maraj, N., Dozois, D. J. A., & Partridge, K. (2008). Letting Go: Mindfulness and Negative Automatic Thinking. *Cognitive Therapy and Research*, 32(6), 758–774. https://doi.org/10.1007/s10608-007-9142-1

Garrison, K. A., Santoyo, J. F., Davis, J. H., Thornhill, T. S., Kerr, C. E., & Brewer, J. A. (2013). Effortless awareness: using real time neurofeedback to investigate correlates of posterior cingulate cortex activity in meditators' self-report. *Frontiers in human neuroscience*, 7, 440. https://doi.org/10.3389/fnhum.2013.00440

Gilpin, R. (2008). The use of Theravada Buddhist practices and perspectives in mindfulness-based cognitive therapy. *Contemporary Buddhism: An Interdisciplinary Journal*, 9, 227–251

Gold, J. W. M. (2021). Wholesome Mind Ethics: A Buddhist Paradigm. *Journal of Value Inquiry*. https://doi.org/10.1007/s10790-021-09845-7

Grabovac, A., Lau, M. A., & Willett, B. R. (2011). Mechanisms of Mindfulness: A Buddhist Psychological Model. *Mindfulness*, 2(3), 154–166. https://doi.org/10.1007/s12671-011-0054-5

Greicius, M. D., Krasnow, B., Reiss, A. L., & Menon, V. (2003). Functional connectivity in the resting brain: a network analysis of the default mode hypothesis. *Proceedings of the National Academy of Sciences of the United States of America*, 100(1), 253–258. https://doi.org/10.1073/pnas.0135058100

Grof, S., & Grof, C. (2010). Holotropic breathwork. State University of New York Press.

Gupta, K., & Agrawal, J. (2022). An empirical study of ancient wisdom : Effect of anasakti (non-attachment) and ahamkara (ego) on well-being amongst Indians. *European Journal of Mental Health*, 17(3), 78–95. https://doi.org/10.5708/ejmh.17.2022.3.6

Hanh T. N. (1998). The Heart of the Buddha's Teachings. New York, NY: Harmony Books

Hemo, C., & Lev-Ari, L. (2015). Focus on your breathing: Does meditation help lower rumination and depressive symptoms?. *International journal of psychology and psychological therapy*, 15(3), 349-359

Hepburn, S. J., Carroll, A., & McCuaig, L. (2021). The Relationship between Mindful Attention Awareness, Perceived Stress and Subjective Wellbeing. *International journal of environmental research and public health*, 18(23), 12290. https://doi.org/10.3390/ijerph182312290

Higgins, E. T., Bargh, J. A., & Lombardi, W. J. (1985). Nature of priming effects on categorization. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 11(1), 59–69. https://doi.org/10.1037/0278-7393.11.1.59

Ho, C., Yu, B., & Mak, W. (2022). Nonattachment mediates the associations between mindfulness, well-being, and psychological distress: A meta-analytic structural equation modeling approach. *Clinical Psychology Review*, 95. https://doi.org/102175. 10.1016/j.cpr.2022.102175

Hopper, S. I., Murray, S. L., Ferrara, L. R., & Singleton, J. K. (2018). Effectiveness of diaphragmatic breathing on physiological and psychological stress in adults: a quantitative systematic review protocol. *JBI Database of Systematic Reviews and Implementation Reports, 16*(6), 1367–1372. https://doi.org/10.11124/JBISRIR-2017-003477

Howarth, A., Smith, J., Perkins-Porras, L., & Ussher, M. (2019). Effects of brief mindfulness-based interventions on health-related outcomes: a systematic review. *Mindfulness*. 10. https://doi.org/10.1007/s12671-019-01163-1

Johnson, A. H., Wilson, J., Magner, D., Urban, R. W., Martin, S., & Zhang, Y. (2022). Exploring meditation profiles and predictors in nursing students. *Journal of holistic nursing: official journal of the American Holistic Nurses' Association*. https://doi.org/10.1177/08980101221102691

Josipovic Z. (2014). Neural correlates of nondual awareness in meditation. *Annals of the New York Academy of Sciences*, 1307, 9–18. https://doi.org/10.1111/nyas.12261

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. https://doi.org/10.1093/clipsy.bpg016

Kabat-Zinn, J. (2004). Where ever you go, there you are: Mindfulness meditation for everyday life. New York, NY: Hyperion

Kabat-Zinn, J. (2011). Some reflections on the origins of MBSR, skillful means, and the trouble with maps. *Contemporary Buddhism. An Interdisciplinary Journal*, 12, 281–306. http://dx.doi.org/10.1080/14639947.2011.564842

Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., Lenderking, W. R., & Santorelli, S. F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American journal of psychiatry*, 149(7), 936–943. https://doi.org/10.1176/ajp.149.7.936

Kang, Y., Gruber, J., & Gray, J. (2013). Mindfulness and de-automatization. *Emotion Review, 5*(2), 192–201. https://doi.org/10.1177/1754073912451629

Karunamuni, N., & Weerasekera, R. (2019). Theoretical foundations to guide mindfulness meditation: a path to wisdom. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, 38(3), 627–646. https://doi.org/10.1007/s12144-017-9631-7

Kim, S., Kim, G., & Ki, J. (2014). Effects of group art therapy combined with breath meditation on the subjective well-being of depressed and anxious adolescents. *Arts in Psychotherapy*, 41(5), 519–526. https://doi.org/10.1016/j.aip.2014.10.002

Kong, F., Wang, X., & Zhao, J. (2014). Dispositional mindfulness and life satisfaction: The role of core self-evaluations. *Personality and Individual Differences*, 56, 165–169. https://doi.org/10.1016/j.paid.2013.09.002

Koster, E. H., De Lissnyder, E., Derakshan, N., & De Raedt, R. (2011). Understanding depressive rumination from a cognitive science perspective: the impaired disengagement hypothesis. *Clinical psychology review*, 31(1), 138–145. https://doi.org/10.1016/j.cpr.2010.08.005

Kuijpers, H., Van Der Heijden, F., Tuinier, S., & Verhoeven, W. (2007). Meditation-induced psychosis. *Psychopathology*, 40(6), 461–464. https://doi.org/10.1159/000108125

Lam, S. U., Riordan, K. M., Simonsson, O., Davidson, R. J., & Goldberg, S. B. (2023). Who sticks with meditation? Rates and predictors of persistence in a population-based sample in the USA. *Mindfulness*, 14(1), 66–78. https://doi.org/10.1007/s12671-022-02061-9

Levinson, D. B., Stoll, E. L., Kindy, S. D., Merry, H. L., & Davidson, R. J. (2014). A mind you can count on: Validating breath counting as a behavioral measure of mindfulness. *Frontiers in Psychology*, 5, Article 1202. https://doi.org/10.3389/fpsyg.2014.01202

Li, X., Ma, L., & Li, Q. (2022). How Mindfulness Affects Life Satisfaction: Based on the Mindfulness-to-Meaning Theory. *Frontiers in Psychology*, 13. https://doi.org/10.3389/fpsyg.2022.887940

Lyubomirsky, S., & Nolen-Hoeksema, S. (1993). Self-perpetuating properties of dysphoric rumination. *Journal of Personality and Social Psychology*, 65(2), 339–349. https://doi.org/10.1037/0022-3514.65.2.339

Marchetti, I., Mor, N., Chiorri, C., & Koster, E. H. W. (2018). The Brief State Rumination Inventory (BSRI): Validation and psychometric evaluation. *Cognitive Therapy and Research*, 42(4), 447–460. https://doi.org/10.1007/s10608-018-9901-1

Martin, J. R. (1997). Mindfulness: A proposed common factor. *Journal of Psychotherapy Integration*, 7(4), 291–312. https://doi.org/10.1023/B:JOPI.0000010885.18025.bc

Matko, K., & Sedlmeier, P. (2019). What is meditation? Proposing an empirically derived classification system. *Frontiers in Psychology*, 10. https://doi.org/10.3389/fpsyg.2019.02276

Monteiro, L. M., Musten, R.F., & Compson, J. (2015). Traditional and contemporary mindfulness: Finding the middle path in the tangle of concerns. *Mindfulness,* 6(1), 1–13. https://doi.org/10.1007/s12671-014-0301-7

Montero-Marin, J., Puebla-Guedea, M., Herrera-Mercadal, P., Cebolla, A., Soler, J., Demarzo, M., Vazquez, C., Rodríguez-Bornaetxea, F., & García-Campayo, J. (2016). Psychological effects of a 1-month meditation retreat on experienced meditators: The role of non-attachment. *Frontiers in psychology*, 7, 1935. https://doi.org/10.3389/fpsyg.2016.01935

Nash, J. D., Newberg, A., & Awasthi, B. (2013). Toward a unifying taxonomy and definition for meditation. *Frontiers in psychology*, 4, 806. https://doi.org/10.3389/fpsyg.2013.00806

Nolen-Hoeksema S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of abnormal psychology*, 109(3), 504–511.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of abnormal psychology*, 100(4), 569–582. https://doi.org/10.1037//0021-843x.100.4.569

Owens, M., & Bunce, H. L. (2022). Nature-based meditation, rumination and mental wellbeing. *International Journal of Environmental Research and Public Health, 19*(15), 9118.

Pals, J. L. (2006). Narrative identity processing of difficult life experiences: pathways of personality development and positive self-transformation in adulthood. *Journal of Personality*, 74(4), 1079–1110. https://doi.org/10.1111/j.1467-6494.2006.00403.x

Pande, N., & Naidu, R. K. (1992). Anāsakti and health: A study of non-attachment. *Psychology and Developing Societies*, 4(1), 89-104. https://doi.org/10.1177/097133369200400106

Papies, E. K. (2016). Health goal priming as a situated intervention tool: How to benefit from nonconscious motivational routes to health behaviour. *Health psychology review*, 10(4), 408–424. https://doi.org/10.1080/17437199.2016.1183506

Park, Y.-J., & Park, Y.-B. (2012). Clinical utility of paced breathing as a concentration meditation practice. *Complementary Therapies in Medicine*, 20(6), 393–399. https://doi.org/10.1016/j.ctim.2012.07.008

Patel, T. R. (2012). Environmental enrichment: Aging and memory. *The Yale journal of biology and medicine*, 85(4), 491–500.

Perestelo-Pérez, L., Barraca, J., Peñate, W., Rivero-Santana, A., & Álvarez-Pérez, Y. (2017). Mindfulness-based interventions for the treatment of depressive rumination: Systematic review and meta-analysis. *International Journal of Clinical and Health Psychology*, 17(3), 282–295. https://doi.org/10.1016/j.ijchp.2017.07.004

Poulin, P. A., Mackenzie, C. S., Soloway, G., & Karayolas, E. (2008). Mindfulness training as an evidence-based approach to reducing stress and promoting well-being among human services professionals. *International Journal of Health Promotion and Education,* 46(2), 72–80. https://doi.org/10.1080/14635240.2008.10708132.

Raichle, M. E. (2015). The brain's default mode network. *Annual Review of Neuroscience*, 38(1), 433–447. https://doi.org/10.1146/annurev-neuro-071013-014030

Ram, D., Mushtaq, N. F., Honnugudi, B. D., & Alammar, M. A. (2022). Level and relationships of life satisfaction with cognitive flexibility and resilience in IT Professionals. *Indian Journal of Occupational and Environmental Medicine*, 26(2), 84–90. https://doi.org/10.4103/ijoem.ijoem_213_21

Rapgay, L., & Bystrisky, A. (2009). Classical mindfulness. *Annals of the New York Academy of Sciences*, 1172(1), 148–162. https://doi.org/10.1111/j.1749-6632.2009.04405.x

Rybak, C. (2013) Nurturing positive mental health: Mindfulness for wellbeing in counseling. *International Journal for the Advancement of Counselling*, 35, 110–119. https://doi.org/10.1007/s10447-012-9171-7

Sahdra, B. K., Shaver, P. R., & Brown, K. W. (2010). A scale to measure nonattachment: A Buddhist complement to Western research on attachment and adaptive functioning. *Journal of Personality Assessment*, 92(2), 116–127. https://doi.org/10.1080/00223890903425960.

Sahdra, B., Ciarrochi, J., & Parker, P. (2016). Nonattachment and mindfulness: Related but distinct constructs. *Psychological Assessment*, 28(7), 819–829. https://doi.org/10.1037/pas0000264

Santos, A. & Relojo-Howell, D. (2020). Lifestyle and cognitive functioning of Filipino older adults as basis for cognitive enhancement programme. *Psychology & Society,* 4(82), 97–105. https://doi.org/10.35774/pis2020.04.097

Schacter, D. L., & Buckner, R. L. (1998). Priming and the brain. *Neuron*, 20(2), 185-195.

Scheibner, H. J., Bogler, C., Gleich, T., Haynes, J., & Bermpohl, F. (2017). Internal and external attention and the default mode network. *NeuroImage*, 148, 381–389. https://doi.org/10.1016/j.neuroimage.2017.01.044

Sedlmeier, P., & Srinivas, K. (2021). Psychological Theories of meditation in early Buddhism and sāṃkhya/yoga. *The Oxford Handbook of Meditation*, 546–568. https://doi.org/10.1093/oxfordhb/9780198808640.013.27

Soler, J., Montero-Marin, J., Domínguez-Clavé, E., González, S. S., Pascual, J. M., Cebolla, A., Demarzo, M. M. P., Analayo, B., & García-Campayo, J. (2021). Decentering, Acceptance, and Non-Attachment: Challenging the Question "Is It Me?" *Frontiers in Psychiatry*, 12. https://doi.org/10.3389/fpsyt.2021.659835

Sparby, T., & Sacchet, M. D. (2022). Defining Meditation: Foundations for an activity-based phenomenological classification system. *Frontiers in psychology*, 12, 795077. https://doi.org/10.3389/fpsyg.2021.795077

Strohmaier, S., Jones, F. W., & Cane, J. E. (2021). One-session mindfulness of the breath meditation practice: a randomized controlled study of the effects on state hope and state gratitude in the general population. *Mindfulness*, 13(1), 162–173. https://doi.org/10.1007/s12671-021-01780-9

Suh, E. M., Diener, E., & Updegraff, J. A. (2008). From culture to priming conditions: self-construal influences on life satisfaction judgments. *Journal of Cross - Cultural Psychology*, 39(1), 3–3.

Szabo, A., & Kocsis, Á. (2016). Psychological effects of deep-breathing: the impact of expectancy-priming. *Psychology, health & medicine*, 22(5), 564–569. https://doi.org/10.1080/13548506.2016.1191656

Teasdale, J. & Chaskalson, M. (2011). How does mindfulness transform suffering? I: The nature and origins of dukkha. *Contemporary Buddhism*. 12. 89-102. 10.1080/14639947.2011.564824.

Thubten, A (2009). No self, no problem: awakening to our true nature. Shambhala. Edited by Sharon Roe.

Tulving, E., & Schacter, D. L. (1990). Priming and human memory systems. *Science*, 247(4940), 301–306. https://doi.org/10.1126/science.2296719

Tumati, S., Paulus, M. P., & Northoff, G. (2021). Out-of-step: Brain-heart desynchronization in anxiety disorders. *Molecular Psychiatry,* 26(6), 1726–1737. https://doi.org/10.1038/s41380-021-01029-w

Ueberholz, R. Y., & Fiocco, A. J. (2022). The effect of a brief mindfulness practice on perceived stress and sustained attention: Does priming matter?. *Mindfulness*, 13(7), 1757–1768. https://doi.org/10.1007/s12671-022-01913-8

van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S. W., Kerr, C. E., Gorchov, J., Fox, K. C. R., Field, B. A., Britton, W. B., Brefczynski-Lewis, J. A., & Meyer, D. E. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 13*(1), 36–61. https://doi.org/10.1177/1745691617709589

van Emmerik, A. A. P., Berings, F. & Lancee, J. (2018). Efficacy of a mindfulness-based mobile application: A randomized waiting-list controlled trial. *Mindfulness*, 9, 187–198. https://doi.org/10.1007/s12671-017-0761-7

Voicu, B. (2015). Priming effects in measuring life satisfaction. *Social Indicators Research*, 124(3), 993–1013. https://doi.org/10.1007/s11205-014-0818-0

Walsh, K. M., Saab, B. J., & Farb, N. A. (2019). Effects of a mindfulness meditation app on subjective well-being: Active randomized controlled trial and experience sampling study. *JMIR mental health*, 6(1), e10844. https://doi.org/10.2196/10844

Wang, K., & Kong, F. (2020). Linking trait mindfulness to life satisfaction in adolescents: The mediating role of resilience and self-esteem. *Child Indicators Research, 13*, 321–335. https://doi.org/10.1007/s12187-019-09698-4

Whitehead, R., Bates, G., Elphinstone, B., Yang, Y., & Murray, G. (2018). Letting go of self: The creation of the Nonattachment to Self Scale. *Frontiers in Psychology, 9*, Article 2544. https://doi.org/10.3389/fpsyg.2018.02544

Whitehead, R., Bates, G., & Elphinstone, B. (2019a). Stories of suffering and growth: An investigation of the lived experience of nonattachment. *Contemporary Buddhism, 19*, 1–28. https://doi.org/10.1080/14639947.2018.1572311

Whitehead, R., Bates, G., Elphinstone, B., Yang, Y., & Murray, G. (2019b). Nonattachment mediates the relationship between mindfulness and psychological well-being, subjective well-being, and depression, anxiety, and stress. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, 20*(7), 2141–2158. https://doi.org/10.1007/s10902-018-0041-9

Whitehead, R., Bates, G., & Elphinstone, B. (2020). Growing by letting go: Nonattachment and mindfulness as qualities of advanced psychological development. *Journal of Adult Development, 27*(1), 12–22. https://doi.org/10.1007/s10804-018-09326-5