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Trait and State Equanimity: The Effect of Mindfulness-Based Meditation Practice

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Abstract

Objectives: Buddhist and scientific theories have described equanimity as a general outcome of mindfulness practices. Equanimity is a calm and balanced state of mind regardless of the valence of situations or objects and is a decoupling between the evaluation of this valence and the resulting common automatic approach or avoidance reactions. The relation between the practice of mindfulness and equanimity still remain to be empirically explored.

Methods: We conducted a correlational study (N = 106) to investigate the relation between hours of mindfulness practice among former mindfulness-based stress reduction program participants and two components of equanimity: even-minded state of mind and hedonic independence, using the EQUA-S. A second study (N = 86) investigated experimentally the effect of two meditation practices on equanimity among novice participants.

Results: The results of the first study revealed positive correlations between the components of equanimity and both formal and informal mindfulness practices. Results from the second study revealed that the increase in even-minded state of mind during the experimental session was significantly greater in the mindfulness practice condition than in the active control condition. Hedonic independence was not significantly affected by the short mindfulness practice.

Conclusions: These results confirmed the importance of empirically studying equanimity at both trait and state levels, and identifying its relation and specificities with meditation and related phenomena.

Equanimity is becoming the subject of increasing interest in contemplative studies as a general outcome of mindfulness practices (Desbordes et al., 2015), as it appears to be a meaningful mechanism to understand the positive effects of mindfulness on well-being (e.g. Ekman et al., 2005; Juneau et al., 2019). Equanimity, as a quality, was first introduced in Buddhist theories (*upekkhā* in Pali), and has since been described as “an even-minded mental state or dispositional tendency toward all experiences or objects, regardless of their affective valence (pleasant, unpleasant or neutral) or source” (Desbordes et al., 2015, p.17). Through mindfulness practices, the development of equanimity brings a new perspective on our emotions and allows for better emotion regulation. Even if emotion regulation is often studied in psychology and mindfulness studies, few research studies have focused on the specific characteristics of equanimity. Some theoretical distinctions between equanimity and other emotion regulation strategies still need to be described, and the link between equanimity and mindfulness practices needs to be tested.

Emotion regulation strategies are highly studied because of their impact on well-being (e.g. Schutte et al., 2009), positive and negative affect (Brans et al., 2013), interpersonal functioning (Gross & John, 2003); they are also considered as meaningful factors for mental health (e.g. lower depression, anxiety; Aldao et al., 2010; Martin & Dahlen, 2005). As proposed in Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), these positive effects do not mainly depend on the type of emotional strategies used, but rather on the ability to be flexible and to adapt emotion regulation strategies to the context (e.g. Quoidbach et al., 2010). This regulation can also occur at different times during emotional processing: from the first perception of a stimulus to the behavioral response to it (Gross, 1999). When internal or external cues enter the field of perception, they generate an evaluation of emotional valence, which can be evaluated as more or less intense. Subsequently, a response tendency, which may be cognitive, physiological and/or behavioral, arises. These response tendencies are followed or modulated by emotion regulation. Emotion regulation has been described as something that includes all conscious and non-conscious strategies used to increase, maintain, or decrease one or more components of an emotional response (Gross & John, 2003). Gross also described two classes of emotion regulation strategies. The first happens before the emotion arises, for instance by modifying one's attention or anticipating an emotional situation and framing the environment accordingly to avoid any discomfort (i.e. antecedent-focused emotion regulation). This class of strategies refers to the modification of either the external environment (e.g. avoidance of seeing enemies) or modification of the internal environment through self-control of one's thoughts (see Gross, 1998). The second class of emotion regulation strategies occurs after the emotion arises by modulating the response to the emotion (i.e. response-focused emotion regulation), such as reappraisal or suppression. Both antecedent and response focused regulation processes need cognitive resources to be used efficiently, which may be problematic when these resources are not available or are impaired (Carlson & Wang, 2007; Ochsner & Gross, 2005; Schmeichel, 2007). Specific exercises can increase functional emotion regulation, such as mindfulness meditation practices (Farb et al., 2014). Studies have shown a strong positive effect on functional emotion regulation (Kumar et al., 2008; Robins et al., 2012), a decrease in emotional reactivity (Farb et al., 2010), and an increase in emotional stability (Lee et al., 2014; Taylor et al., 2011). Nevertheless, we propose that, taken together, the effects of mindfulness practice on emotion regulation can be more specifically described as an improvement of equanimity. Indeed, mindfulness, as a training towards moment-to-moment awareness, teaches how to *observe* emotions rather than teaching explicitly how to *control* emotions. Teasdale (1999) suggested that mindfulness meditation helps to develop metacognitive awareness, which is to "experience thoughts as thoughts (that is, as events in the mind, rather than as, necessarily, accurate reflections of reality)" (p.147; see also Dahl et al., 2015). Indeed, without metacognitive insight, thoughts and emotions can be interpreted as a personal and internal reality rather than as the product of the mind. Habitual and automatic associations between the valence of perceived stimuli and one's mental events (i.e. emotions, thoughts) generally lead to fluctuating emotional states, depending on the absence, presence, or anticipation of stimuli. With a mindful state, mental event activation is stopped by moment-to-moment awareness, interrupting the stream of automatic associations. Because stimuli are fluctuating and impermanent, emotional states follow a similar pathway, leading to fluctuating rather than durable and stable happiness (Dambrun et al., 2012) and eudemonic well-being (Ryan & Deci, 2001). Indeed, Buddhist practices, as mindfulness meditations, aim to bring about a stable state of well-being that is not dependent on stimuli (Wallace, 1999): "One of the fundamental Buddhist premises that underlies this presentation of well-being is that mental suffering is due in large part to imbalances of the mind" (Wallace & Shapiro, 2006, p. 693). Mindfulness practice teaches how to attain this state of equanimity (Grabovac et al., 2011; Wallace & Shapiro, 2006) by decreasing automatic fusion with experiences and increasing decentering abilities (Grabovac et al., 2011). This change leads to a decoupling and de-automatization of the sensorial evaluation of emotional stimuli and the affective reaction to it (Corcoran et al., 2010; Hadash et al., 2016; Vago & Silbersweig, 2012). The intensity, strength, and duration of emotional states can thus be modified.

Up to now, few studies have experimentally investigated equanimity towards emotional reactions, but many studies have shown the effect of secular practices of mindfulness (as introduced in mindfulness-based interventions) on emotional reactions. Indeed, several studies with different methodologies have shown that mindfulness practices lead to a reduction in the intensity, strength, and duration of emotional reactions. When looking at mindfulness as a state, after a brief mindfulness practice focusing on breathing (and compared to a control group) for example, participants showed a decrease in negative affect rating toward neutral pictures (Arch & Craske, 2006) and greater emotional stability (Dambrun et al., 2019). Those who had more difficulties in regulating their emotions showed an increase in positive affect rating for a positive film after a mindful breathing exercise compared to a control condition (Erisman & Roemer, 2010). An engagement in an 8-week mindfulness-based intervention was also linked to a decrease in negative emotional experience in anxious individuals (Goldin & Gross, 2010), as well as a greater ability to manage anxiety in non-clinical participants (Kaviani et al., 2011). Emotional interference—that is, the impact of emotions on a parallel task—also decreased with the practice of a 15-minute mindfulness practice (Ortner et al., 2007). The practice of mindfulness therefore appears to increase positive affect, decrease negative affect, lead to a decrease in the intensity of the emotional assessment of positive and negative stimuli, and enhance emotional stability.

When looking at mindfulness as a disposition, mainly using the Mindfulness Attention and Awareness Scale (MAAS), participants with higher trait-mindfulness showed a decrease in physiological responses to stressful situations (cortisol responses: Brown et al., 2012; skin conductance: Kadziolka et al., 2016), a better recovery after a negative stimuli, and less emotional interference (Cho et al., 2017). Using the Five Facet Mindfulness Questionnaire (FFMQ, mainly the non-reactivity and non-judging subscale), the participants with the highest scores showed lower negative and positive emotional lability and emotional differentiation (i.e. discrimination between their emotions). The results also showed that the non-reactivity and non-judging subscale and the describe subscale of the FFMQ were associated with lower emotion regulation difficulties (Hill & Updegraff, 2012). This study highlighted the role of non-reactive and non-judgmental mechanisms in emotional responses, as well as the moderating effect of a greater awareness of internal emotional responses.

Taylor et al. (2011) studied the neurological distinction between experienced and novice meditators in a mindful state. They found that both groups showed a decrease in evaluation of the intensity of positive and negative images, but this was due to distinct neural mechanisms. For experienced meditators, a mindful state induced a deactivation of the default mode network areas, suggesting that they were more inclined to accept their emotional states without producing self-referential thoughts, such as rumination or memories. For novices, however, this attenuation of emotional intensity when experiencing positive and negative stimuli was produced by a voluntary regulatory process after the first emotional evaluation. Thus, in the long run, mindfulness practices induce a more stable emotional regulation with a lower need for higher control processes. Consistently, several studies showed that novice meditators in a mindful state used more top-down processes to regulate their emotions, while expert meditators were more inclined to use bottom-up processes (Chiesa et al., 2013; Taylor et al., 2011).

In sum, the regulation of emotional responses is affected by different processes depending on the level of experience of the meditators. Mindfulness, by increasing non-judgmental and non-reactive responses to positive and negative emotions, situations, and objects, allows for more balanced and calm reactions, which rapidly reduces the intensity of emotional states and, in the long run, reduces the disorders such states may cause. Equanimity towards emotional situations may develop with longer practice of meditation, but it can also be observed after a short mindfulness exercise through a calmer reaction to emotional stimuli (Delmonte, 1984; Ortner et al., 2007). More practice would lead to less need for regulation and effort, which could lead to an upstream balance. A previous paper described two components of equanimity: equanimity as an even-minded state of mind (E-MSM) and equanimity as a decoupling between the hedonic tone of stimuli and the response to it (hedonic independence, HI; Juneau et al., 2019). These two components are linked to the Buddhist definition of equanimity as a quality of the mind, but also have distinct effects on one’s emotional state. The first component, E-MSM, has been well described by Desbordes et al. (2015) as remaining calm and stable regardless of the affective valence of situations or objects. The global scores of the FFMQ scale, used to measure dispositional mindfulness, are correlated with the E-MSM, as measured by the E-MSM subscale of the EQUA-S, but not all subscales were: E-MSM is strongly correlated with the non-reactivity subscale, the non-judging subscale, and the acting with awareness subscale. E-MSM has also been linked to many emotion regulation strategies (positive correlations with acceptance, positive reappraisal, refocusing on planning, putting into perspective, and negative correlations with rumination and catastrophizing), as well as emotional stability (lower levels of neuroticism; see Juneau et al., 2019). Thus, this EQUA-S subscale seems to be related to the state of mindfulness and could therefore be increased by mindfulness practices. The other component, hedonic independence (HI), which describes a state in which one's reactions, are not driven by the affective evaluation of external stimuli (Dambrun & Ricard, 2011; Hadash et al., 2016) could also be increased by mindfulness practices. HI, as measured by the HI subscale of the EQUA-S, correlated with the acting with awareness subscale of the FFMQ and behavioral responses such as addictive behaviors, problematic eating behaviors, impulsivity and sensibility to reward (Juneau et al., 2019). However, this subscale address desires and pleasures in front of positive situations and objects, which could be strong and persistent (e.g. Kahneman, Diener, & Schwarz, 1999). Thus, hedonic independence may need more time to increase than E-MSM. In addition, these two subscales were found to be slightly correlated in another study (r =.174, p <.005, Juneau et al., 2019) and are defined as two distinct aspects of equanimity, which is why we propose to analyze the subscales separately.

Our aim in the present article was to clarify the relation between mindfulness practices and the development of equanimity as a trait and as a state. In the first study, we examined the relation between meditation expertise (i.e. numbers of hours of practice) and the two components of equanimity as a trait. We hypothesized that the number of hours of practice would be positively and significantly related to both E-MSM and HI from the EQUA-S. In the second study, we tested the causal effect of mindfulness practice on equanimity as a state. More specifically, novices were trained to meditate for one week and were then invited to take part in a final lab session where they performed a short meditation of 30 minutes. We therefore tested both the effect of the one-week training and the effect of a short meditation practice on equanimity.

Study 1

Method

Participants

A total of 106 participants (N_{women} = 80), aged from 20 to 77 years old, completed the online survey (M = 50.89, SD = 10.68). Two participants were removed from the analyses due to the extreme number of hours of practice compared to the sample mean score (more than 19,000 hours). All participants provided informed written consent prior to their participation to the study.

Procedure

We proposed the study online to approximately 300 former participants of either a mindfulness-based stress reduction program (MBSR) or a mindfulness-based cognitive therapy program (MBCT) at the Mindfulness Auvergne Association in France. Every participant had completed at a minimum, either the MBSR or MBCT cycle. The questionnaire was filled out on the internet by the participants. They agreed to participate in the study and signed the consent form. They were required to provide socio-demographic information (age, gender, occupation, education level, and native language). They then answered questions about their meditation practices, followed by the Equanimity Scale, the Emotional Regulation subscale from the PEC and the neuroticism subscale from the BFI. They were finally thanked for their participation

Measures

Questions about participant' meditation practice are used to calculate the average number of total hours of training (such as used by Lutz et al., 2009 for example). Participants were asked about their frequency and how long they have been practicing (i.e. "how many years ago did you start meditating"; "how many times a week have you practiced formal (sitting, lying down, during a time devoted solely to meditation)/informal (in everyday life) meditation in recent years"; "how much time do you spend doing formal/informal meditation per day", etc.). We also asked for the number of retreats, as well as the average duration and daily time of practice at these retreats. For an exploratory purpose, participants were then asked to rate on a scale (0 = never, 100= very often) the frequency of their different meditation practices based on a list of type of practices (i.e. sitting meditation, observation of thoughts and emotions, etc.; see also Matko et al., 2018). We chose to use this list because it was based on interviews of experts from many meditation traditions and schools, and it proposes a new classification coming from a large range of practices. Through this exploratory question, our aim was to cover a diversity of meditation practices in this study, not only those practiced in the classical MBSR or MBCT, in order to see if the score of equanimity is linked to specific types of meditation practices.

We then asked participants to complete the Equanimity Scale (EQUA-S, Juneau et al., 2019), divided into the E-MSM (8 items, example of item: "I am not easily disturbed by something unexpected") and the HI subscales (6 reversed items, example of item: " When I anticipate to do something pleasant, I only think about that"). Statements from the E-MSM and the HI subscales were presented mixed together. Both subscales showed satisfactory reliability (HI α = 0.85; E-MSM α = 0.80). For the EQUA-S, participants answered on a visual analog scale ranging from 0 to 100 (0 = "never or rarely true" and 100 = "always or very often true") and the question order was randomized. The Emotional Regulation subscale from the PEC (Profile of Emotional Competence; Brasseur et al., 2013) had an adequate reliability (α = 0.80). The neuroticism subscale from the BFI (Plaisant et al., 2010) also had a satisfactory reliability (α = 0.80). The PEC and the BFI subscales were rated on a 5-point Likert-type scale (1 = "never or rarely true" and 5= "always or very often true"). Finally, we asked participants if they had ever performed specific meditations related to equanimity (*upekkhā* in Pali).

Data Analyses

We computed an average number of hours of practices by multiplying the daily frequency and the number of years of practice. We used Pearson's correlational analyses to look for a relation between each EQUA-S subscale and others variables and an independent samples t-test for gender differences.

Results

Table 1.
Descriptive data of practice levels

Practices	Minimum	Maximum	Mean (*SD)*
Formal meditation practices (*hours*)	0*	3,529.1	321.37 (*570.33*)
Informal meditation practices (*hours*)	0	10,584	754.42 (*1,719*)
Total meditation practices (*hours*)	6	13,655.67	1,074.25 (*2,170.17*)
Years of experience (*years*)	0.5	21	3.37 (*3.56*)

Note: * This minimal score was obtained because the question asked participant about practices in the last year. Some participants could therefore have followed the MBSR training a few years ago and stopped practicing in the last year.

Correlations between scales

The two EQUA-S subscales—E-MSM and HI—were significantly and positively correlated (r = .35, p < .001). The E-MSM correlated positively and strongly with emotional regulation measured by the PEC (r = .78, p < .001) and negatively with the BFI-Neuroticism subscale (r = −.71, p < .001). The HI subscale also correlated significantly but more modestly with the PEC emotion regulation subscale (r = .31, p < .001), and with the BFI-N subscale (r = −.25, p

< .01). Finally, the BFI-N subscale and the PEC emotional regulation subscale correlated significantly (*r* = - .66, *p* < .001)

Age and gender

There was a positive correlation with age for the HI subscale (*r* = .22, *p* < .03). A t-test also revealed a significant difference between men and women for the HI subscale (respectively M_{men} = 68.08, *SD.* = 17.76; M_{women} = 55.65, *SD* = 19.98; *t* (104) = 2.83 *p* = .006) and a marginal difference for the E-MSM subscale (M_{men} = 56.54, *SD* = 14.61, M_{women} = 50.08; *SD* = 16.23; *t* (104) = 1.80, *p* =.074)

Correlation between EQUA-S and the number of hours of practice

The average number of hours of meditation practice has been used in these analyses (*M* = 1074.25, *SD* = 2,170.17; see Table 1 for more details). First, we examined the relation between equanimity and the total amount of practice (formal and informal). We found significant and positive correlations between the total hours of mindfulness practice, and the two equanimity subscales: *r* = .33, *p* < .001 for E-MSM and *r* = .21, *p* = .034 for HI. As the number of hours of practice increases, the scores for the E-MSM and the HI increased as well. We also examined the distinct relation of average hours of formal and informal practices on equanimity. We tested the correlations between E-MSM and each type of practice, and we found a positive and significant correlation for both informal (*r* = .33, *p* < .001) and formal practices (*r* = .27, *p* = .006). We also conducted these distinct analyses for the HI subscale and found correlations with both informal (*r* = .20, *p* = .043) and formal practices as well (*r* =.20, *p* = .046). Thus, both types of practice, formal and informal, are significantly related to equanimity.

Table 2.
Correlations between total number of meditation practice hours and equanimity (i.e. even-minded state of mind [E-MSM] and Hedonic Independence [HI]).

EQUA-S subscales	Formal meditation practices	Informal meditation practices	Total of meditation practices
E-MSM	.27**	.33***	.33***
HI	.20*	.20*	.21*

Note: *** <.001 ** <.01, * <.05

Relations between the EQUA-S and the type of meditation

For exploratory purposes, we investigated the relations between equanimity and the many possible types of meditation practices. The E-MSM subscale was positively and significantly related to the practices of observing thoughts and feeling (r = .29, p = .01), sitting in silence (r = .36, p < .001), meditation on compassion (r = .25, p = .02), singing sutras/mantras (r = .27, p = .03), repeating some words or syllables (r = .27, p = .03), and concentration on energy centers (r = .26, p = .04). The HI subscale correlated positively and significantly with sitting in silence (r = .20, p = .05), but negatively with contemplation of a spiritual question (r = −.29, p = .02), openness to blessings (r = −.32, p = .004), repeating syllables or words (r = -.26, p = .03), manipulation of breathing (r = −.26, p = .01), and imagination (r = −.35, p = .005). Finally, we also investigated the relation between the practice of equanimity meditation (N = 13) and our two equanimity subscales. We found that participants who had performed specific meditations about equanimity had higher scores on the HI subscale (M = 74.01, SD = 20.57) than those who had not (N = 93; M = 56.56, SD = 19.19; t (104) = 3.05, p = .003), but not on the E-MSM subscale.

Table 3.
Type of meditation, number of participants who practiced it and correlations with the EQUA-S subscales

	Mean	SD	N	*r* with E-MSM	*r* with HI
Lying meditation	33.95	30.85	97	−.16	−.18
Sitting in silence	61.47	31.41	101	.36***	.20*
Observing thoughts and feelings	61.36	27.62	102	.29**	−.18
Concentration on an object	22.92	28.83	87	.18	.04
Contemplating a spiritual question	20.57	30.03	70	.01	−.29*
Open up to blessings	35.55	32.64	83	.10	−.32**
Cultivating compassion	38.57	30.69	92	.25*	−.11
Singing sutras/mantras	10.66	23.14	64	.28*	.04
Repeating syllables or words	14.85	25.38	66	.27*	−.26*
Meditating with sound	26.81	29.44	70	.01	−.22
Meditation with movement	36.28	31.68	79	.16	.11
Manipulation of breathing	39.96	35.71	91	−.02	−.26*
Walking meditation	35.68	28.44	98	.10	−.05
Concentrate on energy centers	21.0	30.19	65	.26*	−.04
Concentration on breathing	69.4	28.09	104	.16	−.11
Body-scan	44.65	32.48	92	.05	−.19
Imagination	21.63	29.92	65	.04	−.35**

Note: *** p<.001, ** p<.01, * p <.05

Discussion

The results of the first study support the prediction that trait-equanimity assessed with the

EQUA-S correlated positively and significantly with the total amount of mindfulness practice among previous MBSR or MBCT participants. As hypothesized, both E-MSM and HI increased as the number of hours of practice increased. We also looked for a possible distinct effect of the approximate total amount of formal and informal practices and found that both practices were related to equanimity scores. Supporting this finding, both informal and formal practices have been related to well-being in other studies and seem more predictive of psychological flexibility than formal practice frequency (Birtwell et al., 2018). We also explored possible relations between the frequencies of different types of meditations and equanimity scores. The results revealed that sitting in silence meditations, as proposed in MBSR and MBCT cycles, are linked to higher E-MSM and HI scores, but many other meditation types were only positively linked to E-MSM. Surprisingly, meditation on spiritual questions, imagination, and blessing as well as manipulation of breath were linked to lower HI scores. As this study only tested correlations, more studies are needed to understand if distinct types of practices can increase or decrease equanimity scores or, potentially, if a lower or a higher trait-equanimity score could lead someone to perform specific practices. Indeed, higher hedonic dependence may lead someone to search for positive affect in meditation, too, and result in practicing more imagination and blessing.

In sum, E-MSM appears to be the more strongly related subscale of the EQUA-S to frequency of mindfulness practices. Indeed, as the E-MSM subscale measures the calm state of mind, this quality may be a result of many practices that aim to develop a non-reactive stance when facing discomfort. This result is consistent with the strong correlation found between the non-reactivity subscale from the FFMQ and the E-MSM subscale in a former study (Juneau et al. 2019). Finally, as presented in the introduction, the E-MSM and HI subscales appear to be two distinct aspects of equanimity. To investigate experimentally the causal role of meditation practices on these two dimensions of equanimity, we conducted a second laboratory experiment testing the effect of body-scan meditation and breathing meditation among novice participants.

Study 2

Method

Participants

A total of 89 students from Clermont Auvergne University took part in this study. Two participants did not come back at Time 2 (one in the breathing and one in the control condition), and data for one participant was not complete in the control condition. Analyses were conducted on the 86 remaining participants (N_{women} = 80, M_{age} = 19.4, SD = 1.04). The students received course credit and signed a formal agreement to participate in this experiment. Participants were randomly assigned to one of the three conditions, with 27 participants in the control condition, 29 in the body-scan meditation condition, and 30 in the breathing meditation condition.

Procedure

The participants were randomly assigned to one of three experimental conditions; body-scan meditation, breathing meditation and control. The procedure was similar for the three groups, except for the type of meditation performed (body-scan exercise, breathing exercise or listening to poems). Before the 30-minute practice session in the laboratory, all participants performed a one-week training. When they first came to the study, they received an information note and a consent form that they had to sign to participate. Then, before completing the first questionnaire (T1), they began with a 5-minute rest period, lying on a mat with their eyes closed. After the first questionnaire was completed, the participants received – on a USB stick – a 11-minute guided exercise to perform at home. In the two meditation conditions, the participants were asked to follow the instruction to focus their attention on the different parts of the body (i.e. body-scan), or on the breath (breathing meditation). Those in the control condition were asked to listen the poems. Participants had to perform the training at home, lying on their backs with their eyes closed, once a day, every day, for a full week. After each daily training, the participants completed a short follow-up notebook. Participants completed an average of 5.9 (*SD* = 1.0) training exercises in the control condition, 6.3 (*SD*= .84) in the body-scan condition, and 6.21 (*SD* = .83) in the breathing condition. There was no significant difference between conditions (F (2, 84) = 1.60, p = .21, *ns*).

One week later, the participants returned to the laboratory for the test session. Again, this session began with a 5-minute rest period, lying on a mat with their eyes closed. The participants then completed the second questionnaire (T2) before returning to the mat for the 30-minute exercise (i.e. body-scan, breathing or poems). At the end of this exercise, the participants had to sit down and complete the questionnaire for the third time (T3). Finally, participants were invited to take part in another and distinct study using a cognitive task on a computer.

It should be noted that all participants responded to the questionnaire three times after a period of quiet lying on a floor mat (for a similar procedure, see Dambrun, 2016 or Dambrun et al., 2019). This procedure makes it possible to compare the participants' responses at the three different times under comparable conditions, as each time the participants completed the questionnaire after a similar period of lying on a floor mat.

Measures

The participants were asked to complete the self-report scales at three different times: before the training session (Time 1), after the one-week training session (i.e. just before the laboratory session; Time 2), and after the laboratory session (Time 3). Using visual analog scale, they were asked to indicate their current state on two distinct scales. The order of presentation of the two scales was counterbalanced. They had to complete the two subscales of the EQUA-S (i.e. E-MSM an HI; Juneau et al. 2019), which had an adequate reliability at Time 1 (E-MSM: α = 0.80; HI: α = 0.80), at Time 2 (E-MSM: α= .92; HI: α = .85), and at Time 3 (E-MSM: α = .94, HI: α = .90). We tested the test-retest reliability between Time 1 and Time 2 and found an acceptable reliability for the E-MSM subscale (r = .73, p = .000) and the HI subscale (r = .61, p =.000) and between Time 1 and Time 3 for the E-MSM subscale (r =.72, p = .000) and the HI subscale (r = .60, p = .000). They also completed the emotion regulation subscale from the PEC (Profile of Emotional Competence; Brasseur et al., 2013; α at Time 1 = .78; α at Time 2 = .86; and α at Time 3 = .89).

Practices

The body-scan and breathing meditation practices consisted of audio files from classical mindfulness exercises. The body-scan audio leads participants to focus on each part of their body, one by one, and to accept disruptive thoughts before bringing their attention back to awareness of their body. In the breathing meditation exercise, participants were asked to focus on the feeling of the breath and to accept disruptive thoughts and emotions before bringing their attention back to breathing. The active control audio was a series of French poems by Prévert, drawn at random from a list (see Droit-Volet et al., 2018). We chose this control condition because it requires attention, like mindfulness practices, but on the content as such and not on the experience itself. This allows us to differentiate the effect of attention to the present moment from that of concentration on the content of something. Similar control conditions have been used in other research studies (Dambrun et al., 2019; Droit-Volet et al., 2018). Each home exercise lasted 11 minutes and the laboratory session exercises lasted 30 minutes.

Data Analyses

We first performed ANOVAs to see if there were any differences at Time 1 between the groups. We then compared conditions with mixed ANOVA and post hoc analyses with a Holm’s sequential adjustment.

Results

The ANOVAs revealed no significant differences between groups for both EQUA-S and PEC scores.

Equanimity

We tested the effect of our experimental manipulation separately for the E-MSM and HI. A 3 (experimental condition: body-scan, breathing, control) × 3 (time: T1, T2, vs. T3) mixed ANOVA on the mean scores of E-MSM was performed. The main effect of time was significant, F (2, 166) = 25.43, p <.001, η^2_p = .24. As predicted, the interaction of time × condition was also significant, F (4, 166) = 2.85, p = 0.026, η^2_p = .064. We separately tested the effect of the one-week training (T1 to T2) and the effect of the 30-minute practice laboratory session (T2 to T3). The difference between T2 and T1 was computed and used a DV in an ANOVA with the experimental condition (i.e. body-scan, breathing, control) as an independent variable. The effect of the experimental condition was not significant (F < 1), thus there was no effect of the one-week training on E-MSM. Then, the effect of the 30-minute practice was submitted to a similar ANOVA with the difference score between T2 and T3 as a DV. The results revealed a significant effect of experimental condition, F (2, 83) = 4.30, p = .017, η^2_p = .094. These analyses indicated that the E-MSM score increased more significantly in the body-scan condition (M = +1.49) than in the control condition (M = -.14), t (83) = -2.92, p_{holm} = .013, d = .73. There was no significant difference between the breathing and the control condition, t (83) = -1.74, p_{holm} = .171, d = .44, *ns*.

Table 4.
Even-minded state of mind mean score per time and condition

Conditions	T1	T2	T3	Training effect	30-minute practice effect
Control	7.2 (2.62)	8.07 (2.76)	7.93 (3.09)	+0.86a	−0.14 a
Body-scan Meditation	8.19 (2.30)	8.90 (3.20)	10.39 (3.13)	+0.71a	+1.49** b
Breathing Meditation	7.25 (2.40)	8.30 (2.52)	9.12 (2.90)	+1.05a	+0.82 ab

Note: *** p<.001, ** p<.01, * p <.05, * Training effect = Mean at T2 − Mean at T1, ** 30-minute practice effect = Mean at T3 − Mean at T2

Table 5.
Hedonic independence mean score per time and condition

Conditions	T1	T2	T3	Training effect	30-minute practice effect
Control	5.21 (2.04)	4.44 (2.09)	4.70 (2.24)	−0.77a	+0.26a
Body-scan Meditation	4.88 (2.09)	4.93 (2.38)	4.43 (2.92)	+0.05a	−0.50a
Breathing Meditation	5.31 (2.56)	4.60 (2.32)	4.45 (2.82)	−0.71a	−0.15a

Note: *** p<.001, ** p<.01, * p <.05, * Training effect = Mean at T2 − Mean at T1, ** 30-minute practice effect = Mean at T3 − Mean at T2

The HI subscale score also was submitted to a 3 (Condition: body-scan, breathing, control) × 3 (time: T1, T2 vs. T3) mixed ANOVA. We found a significant main effect for time (F (2, 166) = 4.65, p =.011, η^2_p = .05). However, the time × condition interaction was not significant (F (4, 166) = 1.01, p > 0.41). Again, we tested the effect of training (T1 to T2) and the effect of the 30-minute practice (T2 to T3) separately. Neither the main effects of time, nor the interaction effects were significant.

Emotional Competence

The effect of training on the PEC scale was computed in a 3 (experimental condition: body-scan, breathing, control) × 3 (time: T1, T2 and T3) mixed ANOVA. We only found a main effect for time, F (2,166) = 43.77, p < .001, η^2_p = .35. The interaction between time × condition was not significant. We separately tested the effect of the training (T1 to T2) and the effect of the 30-minute practice (T2 to T3) and found no significant interaction effects on the PEC. However, the difference between T2 and T3 was significant only in the body-scan condition (M_{T2} = 8.05 and M_{T3} = 9.17; t (28) = −3.32, p = .05, d = -.59) and the breathing condition (M_{T2} = 7.34 and M_{T3} = 8.40; t (29) = −3.66, p < .001, d = -.67), but not in the control condition (M_{T2} = 7.03 and M_{T3} = 7.43, *ns*)

Discussion

In this second study, we found support for an increase of E-MSM scores after a body-scan practice compared to the control condition. As predicted, this subscale was modified by this short practice. Focusing on bodily sensations in the body-scan meditation has been found to increase the non-reactivity facet of the FFMQ (Carmody & Baer, 2008), and emotional stability (Dambrun et al., 2019), which both have also been found to be strongly related to the E-MSM subscale (Juneau et al., 2019). This body-scan meditation drives a shift of perspective on typical emotional reactions, by allowing a sustained attention to bodily sensations generated by emotions (Shapiro et al., 2006). However, we did not find a similar effect of the breathing exercise on the E-MSM subscale. In a recent research study, we found that breathing meditation, which is less guided and therefore has more silent moments than the body-scan meditation, is associated with a significantly higher frequency of thoughts. This kind of meditation seems therefore more difficult for beginners, which makes it less likely to have an effect on E-MSM in the short term. Second, because MBSR programs do not specifically focus on developing equanimity towards external stimuli, both body-scan and breathing meditations borrowed from this program may not be sufficiently effective to increase states of HI as measured through the EQUA-S. These practices teach one how to accept passing thoughts and take a step back from them. Meditation on equanimity does, however, require that practitioners first acknowledge the presence of their attachment and avoidance reactions toward a loved person, an enemy, or a stranger before working on these specific thoughts. Thus, future studies may explore the effects of short equanimity meditation practices that are not offered in MBSR program. Under this perspective, the fact that in Study 1 meditators who practiced equanimity meditations had higher hedonic independence scores than meditators who did not practice this type of meditation is an encouraging result.

General discussion

These studies investigated equanimity as a state and as a trait linked to mindfulness practices. Our first correlational study showed that the more experience participants had in the practice of mindfulness, the higher their equanimity scores. Equanimity as a trait therefore appears to be linked with mindfulness practices. Moreover, the E-MSM component of equanimity increased for novices after a 30-minute body-scan practice, whereas it did not increase after an active control exercise without mindfulness instruction. Thus, novices appear to develop a calmer and more stable emotional state of mind after the practice of body-scan. However, short mindfulness exercises for beginners did not result in higher HI scores. This component of equanimity is described as weaker automatic affective reactions to external stimuli, which have been linked to behavioral reactions, which need more time to change (see Ryan & Deci, 2001; Ryan et al., 2008 about eudemonic well-being). Even if longer mindfulness practices are linked to higher HI in Study 1, short practices for beginners seem not to be sufficient to modify it in Study 2. This suggests that high levels of desire towards pleasant objects or situations may require more meditation practice to be attenuated.

Because HI is strongly linked to addictive and problematic behaviors, future studies need to focus on this component of equanimity to prevent health issues. It may be more difficult to increase the HI component among young people between the ages of 18 and 21 years because of their higher propensity to be driven by incentives and emotional cues (e.g. Somerville et al., 2010). As the first study of this paper suggested that specific meditation on equanimity could be linked to higher HI, future studies need to specifically implement equanimity meditation for young people without meditation experience to improve their HI.

The first study also highlighted the positive role of informal practices in the development of equanimity, which is similar to formal practices. As our participants are former MBSR or MBCT participants, informal practices have formed a large part for their learning process and also appear to be daily practices that are easier to maintain over time than formal or set meditation practices.

Limitations and Future Research Directions

The first limitation of both studies is the use of self-report questionnaires to assess equanimity and meditation practices, which is a subjective measure. Thus, it only allows to examine associations between measures and not analyze causal relations. It is also necessary to take into account the existence of biases in questionnaires that propose several scales that measure different constructs, which can lead to false correlations (Podsakoff et al., 2003). Indirect, more behavioral, or neurophysiological measures of equanimity should be developed. Moreover, more studies should be conducted with this new scale to ensure its reliability and validity, and to better understand the even-minded state of mind and the hedonic independence components (also see Juneau et al., 2019 for a discussion). Moreover, measures of formal and informal meditation hours of practice were subjectively estimated (i.e. “how much time do you spend doing formal/informal meditation per day”). Thus, it would be useful to develop more precise measures in the future.

As the studies were carried out on former MCBT and MBSR participants, it would be useful to carry out the same correlational study in different populations of meditators, following different Buddhist teachings, and with higher levels of practices. Moreover, mindfulness can be defined as a state, a trait, a meditation practice or as an intervention (Vago & Silbersweig, 2012). In our studies, we did not analyze the link between equanimity and mindfulness trait levels. We chose to focus on mindfulness as a practice (longer in the first study and shorter in the second one) in order to see if they were related to trait- and state-equanimity. However, future studies should investigate the developmental path of the two subscales of the EQUA-S and their relation with levels of trait-mindfulness.

The present research provides an overview of the relations between equanimity and the practice of mindfulness-based meditation. The consistency between the results of the two studies highlights the potential causal effect of mindfulness practices on equanimity.

Compliance with Ethical Standards

Conflict of Interest: Authors declare that they have no conflict of interest.

Ethical approval: The studies were approved by the ethical committee of University Clermont-Auvergne. All procedures performed in studies involving human participants were carried out in accordance with the ethical standards and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Author Contributions

CJ: designed, executed, analyzed studies and wrote a first draft. RS: collaborated with the study design and the writing of the article. MD: collaborated with the study design, the data analyses and the writing of the article. All authors approved the final version of the manuscript for submission.

Data Availability

The following information was supplied regarding data availability:

Juneau, Catherine; Shankland, Rebecca; Dambrun, Michael (2020): Trait and State Equanimity: The Effect of Mindfulness-Based Meditation Practice. figshare. Dataset https://doi.org/10.6084/m9.figshare.12162090.v3

References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology : A meta-analytic review. Clinical Psychology Review, 30(2), 217-237. https://doi.org/10.1016/j.cpr.2009.11.004

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

Birtwell, K., Williams, K., van Marwijk, H., Armitage, C. J., & Sheffield, D. (2018). An exploration of formal and informal mindfulness practice and associations with wellbeing. Mindfulness, 10(1), 89-99. https://doi.org/10.1007/s12671-018-0951-y

Brans, K., Koval, P., Verduyn, P., Lim, Y. L., & Kuppens, P. (2013). The regulation of negative and positive affect in daily life. Emotion, 13(5), 926-939. https://doi.org/10.1037/a0032400

Brasseur, S., Grégoire, J., Bourdu, R., & Mikolajczak, M. (2013). The Profile of Emotional Competence (PEC) : Development and validation of a self-reported measure that fits dimensions of emotional competence theory. PLoS ONE, 8(5). https://doi.org/10.1371/journal.pone.0062635

Brown, K. W., Weinstein, N., & Creswell, J. D. (2012). Trait mindfulness modulates neuroendocrine and affective responses to social evaluative threat. Psychoneuroendocrinology, 37(12), 2037-2041. https://doi.org/10.1016/j.psyneuen.2012.04.003

Carlson, S. M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. Cognitive Development, 22(4), 489-510. https://doi.org/10.1016/j.cogdev.2007.08.002

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. Journal of Behavioral Medicine, 31(1), 23-33. https://doi.org/10.1007/s10865-007-9130-7

Chiesa, A., Serretti, A., & Jakobsen, J. C. (2013). Mindfulness : Top–down or bottom–up emotion regulation strategy? Clinical Psychology Review, 33(1), 82-96. https://doi.org/10.1016/j.cpr.2012.10.006

Cho, S., Lee, H., Oh, K. J., & Soto, J. A. (2017). Mindful attention predicts greater recovery from negative emotions, but not reduced reactivity. Cognition and Emotion, 31(6), 1252-1259. https://doi.org/10.1080/02699931.2016.1199422

Corcoran, K. M., Farb, N., Anderson, A., & Segal, Z. V. (2010). Mindfulness and emotion regulation : Outcomes and possible mediating mechanisms. In A. M. Kring & D. M. Sloan (Eds.), Emotion regulation and psychopathology : A transdiagnostic approach to etiology and treatment (p. 339-355). The Guilford Press.

Dahl, C. J., Lutz, A., & Davidson, R. J. (2015). Reconstructing and deconstructing the self : Cognitive mechanisms in meditation practice. Trends in Cognitive Sciences, 19(9), 515-523. https://doi.org/10.1016/j.tics.2015.07.001

Dambrun, M. (2016). When the dissolution of perceived body boundaries elicits happiness : The effect of selflessness induced by a body scan meditation. Consciousness and Cognition, 46, 89-98. https://doi.org/10.1016/j.concog.2016.09.013

Dambrun, M., Berniard, A., Didelot, T., Chaulet, M., Droit-Volet, S., Corman, M., Juneau, C., & Martinon, L. M. (2019). Unified consciousness and the effect of body scan meditation on happiness : Alteration of inner-body experience and feeling of harmony as central processes. Mindfulness, 10(8), 1530-1544. https://doi.org/10.1007/s12671-019-01104-y

Dambrun, M., & Ricard, M. (2011). Self-centeredness and selflessness : A theory of self-based psychological functioning and its consequences for happiness. Review of General Psychology, 15(2), 138-157. https://doi.org/10.1037/a0023059

Dambrun, M., Ricard, M., Després, G., Drelon, E., Gibelin, E., Gibelin, M., Loubeyre, M., Py, D., Delpy, A., Garibbo, C., Bray, E., Lac, G., & Michaux, O. (2012). Measuring happiness : From fluctuating happiness to authentic–durable happiness. Frontiers in Psychology, 3. https://doi.org/10.3389/fpsyg.2012.00016

Delmonte, M. M. (1984). Physiological responses during meditation and rest. Biofeedback and Self-Regulation, 9(2), 181-200. https://doi.org/10.1007/BF00998833

Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W., Olendzki, A., & Vago, D. R. (2015). Moving Beyond Mindfulness : Defining equanimity as an outcome measure in meditation and contemplative research. Mindfulness, 6(2), 356-372. https://doi.org/10.1007/s12671-013-0269-8

Droit-Volet, S., Chaulet, M., & Dambrun, M. (2018). Time and meditation : When does the perception of time change with mindfulness exercise? Mindfulness, 9(5), 1557-1570. https://doi.org/10.1007/s12671-018-0903-6

Ekman, P., Davidson, R. J., Ricard, M., & Wallace, B. A. (2005). Buddhist and psychological perspectives on emotions and well-being. Current Directions in Psychological Science, 14(2), 59-63.

Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. Emotion, 10(1), 72-82. https://doi.org/10.1037/a0017162

Farb, N. A. S., Anderson, A. K., Irving, J. A., & Segal, Z. V. (2014). Mindfulness interventions and emotion regulation. In J. J. Gross (Ed.), Handbook of emotion regulation, (2nd ed, p. 548-567). Guilford Press.

Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one’s emotions : Mindfulness training alters the neural expression of sadness. Emotion, 10(1), 25-33. https://doi.org/10.1037/a0017151

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. Emotion, 10(1), 83-91. https://doi.org/10.1037/a0018441

Grabovac, A. D., 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

Gross, J. J. (1998). Antecedent- and response-focused emotion regulation : Divergent consequences for experience, expression, and physiology. Journal of personality and social psychology, 74(1), 224-237. https://doi.org/10.1037/0022-3514.74.1.224

Gross, J. J. (1999). Emotion Regulation : Past, present, future. Cognition and Emotion, 13(5), 551-573. https://doi.org/10.1080/026999399379186

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes : Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology, 85(2), 348-362. https://doi.org/10.1037/0022-3514.85.2.348

Hadash, Y., Segev, N., Tanay, G., Goldstein, P., & Bernstein, A. (2016). The decoupling model of equanimity : Theory, measurement, and test in a mindfulness intervention. Mindfulness, 7(5), 1214-1226. https://doi.org/10.1007/s12671-016-0564-2

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). Acceptance and commitment therapy : An experiential approach to behavior change. Guilford Press.

Hill, C. L. M., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. Emotion, 12(1), 81-90. https://doi.org/10.1037/a0026355

Juneau, C., Pellerin, N., Elliott, T., Ricard, M., Shankland, R., & Dambrun, M. (2019, July 18). Reliability and validity of an equanimity questionnaire: The two-factor equanimity

scale (EQUA-S). https://doi.org/10.31231/osf.io/a57xd
Kadziolka, M. J., Di Pierdomenico, E.-A., & Miller, C. J. (2016). Trait-like mindfulness promotes healthy self-regulation of stress. Mindfulness, 7(1), 236-245. https://doi.org/10.1007/s12671-015-0437-0
Kahneman, D., Diener, E., & Schwarz, N. (1999). Well-being : Foundations of hedonic psychology. Russell Sage Foundation.
Kaviani, H., Javaheri, F., & Hatami, N. (2011). Mindfulness-based cognitive therapy (MBCT) reduces depression and anxiety induced by real stressful setting in non-clinical population. International Journal of Psychology and Psychological Therapy, 11(2).
Kumar, S., Feldman, G., & Hayes, A. (2008). Changes in mindfulness and emotion regulation in an exposure-based cognitive therapy for depression. Cognitive Therapy and Research, 32(6), 734. https://doi.org/10.1007/s10608-008-9190-1
Lee, Y.-H., Shiah, Y.-J., Chen, S. C.-J., Wang, S.-F., Young, M.-S., & Lin, C.-L. (2014). Improved emotional stability in experienced meditators with concentrative meditation based on electroencephalography and heart rate variability. The Journal of Alternative and Complementary Medicine, 21(1), 31-39. https://doi.org/10.1089/acm.2013.0465
Lutz, A., Greischar, L. L., Perlman, D., & Davidson, R. J. (2009). BOLD signal in insula is differentially related to cardiac function during compassion meditation in experts vs. Novices. NeuroImage, 47(3), 1038-1046. https://doi.org/10.1016/j.neuroimage.2009.04.081
Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. Personality and Individual Differences, 39(7), 1249-1260. https://doi.org/10.1016/j.paid.2005.06.004
Matko K., Ott U., & Seldmeier P. (August, 2018). What is meditation? Revealing structure in the vast meditation landscape. Poster presented at the ESRI Mind & Life, Chiemsee, Germany
Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. Trends in Cognitive Sciences, 9(5), 242-249. https://doi.org/10.1016/j.tics.2005.03.010
Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. Motivation and Emotion, 31(4), 271-283. https://doi.org/10.1007/s11031-007-9076-7
Plaisant, O., Courtois, R., Réveillère, C., Mendelsohn, G. A., & John, O. P. (2010). Validation par analyse factorielle du Big Five Inventory français (BFI-Fr). Analyse convergente avec le NEO-PI-R. Annales Médico-psychologiques, revue psychiatrique, 168(2), 97-106. https://doi.org/10.1016/j.amp.2009.09.003
Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research : A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879-903. https://doi.org/10.1037/0021-9010.88.5.879
Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being : Comparing the impact of eight savoring and dampening strategies. Personality and Individual Differences, 49(5), 368-373. https://doi.org/10.1016/j.paid.2010.03.048
Robins, C. J., Keng, S.-L., Ekblad, A. G., & Brantley, J. G. (2012). Effects of mindfulness-based stress reduction on emotional experience and expression : A randomized controlled trial. Journal of Clinical Psychology, 68(1), 117-131. https://doi.org/10.1002/jclp.20857
Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials : A review of research on hedonic and eudaimonic well-being. Annual Review of Psychology, 52(1), 141-166. https://doi.org/10.1146/annurev.psych.52.1.141
Ryan, R. M., Huta, V., & Deci, E. L. (2008). Living well : A self-determination theory

perspective on eudaimonia. Journal of Happiness Studies, 9(1), 139-170. https://doi.org/10.1007/s10902-006-9023-4
Schmeichel, B. J. (2007). Attention control, memory updating, and emotion regulation temporarily reduce the capacity for executive control. Journal of Experimental Psychology: General, 136(2), 241-255. https://doi.org/10.1037/0096-3445.136.2.241
Schutte, N. S., Manes, R. R., & Malouff, J. M. (2009). Antecedent-focused emotion regulation, response modulation and well-being. Current Psychology, 28(1), 21-31. https://doi.org/10.1007/s12144-009-9044-3
Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. Journal of Clinical Psychology, 62(3), 373-386. https://doi.org/10.1002/jclp.20237
Somerville, L. H., Jones, R. M., & Casey, B. (2010). A time of change : Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. Brain and cognition, 72(1), 124. https://doi.org/10.1016/j.bandc.2009.07.003
Taylor, V. A., Grant, J., Daneault, V., Scavone, G., Breton, E., Roffe-Vidal, S., Courtemanche, J., Lavarenne, A. S., & Beauregard, M. (2011). Impact of mindfulness on the neural responses to emotional pictures in experienced and beginner meditators. NeuroImage, 57(4), 1524-1533. https://doi.org/10.1016/j.neuroimage.2011.06.001
Teasdale, J. D. (1999). Emotional processing, three modes of mind and the prevention of relapse in depression. Behaviour Research and Therapy, 37(Suppl 1), S53-S77. https://doi.org/10.1016/S0005-7967(99)00050-9
Vago, D. R., & Silbersweig, D. A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART) : A framework for understanding the neurobiological mechanisms of mindfulness. Frontiers in Human Neuroscience, 6, 296. https://doi.org/10.3389/fnhum.2012.00296
Wallace, B. Alan, & Shapiro, S. L. (2006). Mental balance and well-being : Building bridges between Buddhism and Western psychology. American Psychologist, 61(7), 690-701. https://doi.org/10.1037/0003-066X.61.7.690
Wallace, B. A. (1999). The Buddhist tradition of Samatha : Methods for refining and examining consciousness. Journal of Consciousness Studies, 6(2-3), 175-187.