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Mindfulness — New Research and Treatment Directions in Post-traumatic Stress Disorder

Delia M. Podea and Karol J. Wild

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Abstract

Combining mindfulness to strengthen emotion regulation with existing empirically supported post-traumatic stress disorder (PTSD) treatments may improve outcomes through increasing (a) engagement, (b) compliance, and (c) decreasing the level of ruminations in PTSD. Several psychotherapeutic interventions incorporating training in mindfulness are clinically relevant to traumatic stress. In order to see how far PTSD treatment could benefit from including mindfulness into the therapeutic process, we analyzed researches regarding: (a) the neuroscience of mindfulness, (b) assessment instruments for mindfulness, (c) mechanism of mindfulness, respective, and (d) the relation between mindfulness and other techniques. Based on this analysis, we can conclude that mindfulness may improve the therapeutic results and the outcome of PTSD patients. Mindfulness can be used in two ways: (a) as an emotion regulation support technique for existing empirically supported PTSD treatments and (b) as a standalone treatment- mindfulness-based cognitive behavior psychotherapies.

Keywords: Mindfulness, Post-Traumatic Stress disorder, PTSD, empirically supported treatments, third-wave CBT

1. Introduction

The “fight-or-flight” response is a natural reaction in order to help the person to react adaptively to harmful events. In post-traumatic stress disorder (PTSD), this reaction is

modified or dysfunctional. Persons who develop PTSD may feel a state of stress or frightened even when there is no danger [1]. PTSD develops after experiencing a physical harm or the threat of physical harm in a terrifying way. Persons who develop PTSD may be directly affected or may have witnessed a harmful event that happened to someone significant, or an unknown person [1].

PTSD can cause many symptoms. Symptoms that can be categorized into areas:

1. Memory and emotional reactivating symptoms

Repetitive flashbacks that reactivate elements from the traumatic event, including experiencing also the physical symptoms.

Bad dreams

Thoughts with a frightening content.

2. Behavioral and cognitive avoidance symptoms

Avoiding places, events, or objects related to the event

Intense emotions (depression, anger, guilt, or anxiety)

Anhedonia

Elective hypoamnesia.

3. Physiological symptoms

Being easily startled

Feeling tense or “on edge”

Insomnia,

Irritability or angry outbursts.

The above mentioned symptoms may interfere with daily tasks, circadian rhythm, or concentrating. Sometimes similar symptoms are present after a dangerous event, but there the intensity and quality is not always dysfunctional. Sometimes people present very intense symptoms that disappear after a few weeks; in this case we may speak about acute stress disorder (ASD). So far the symptoms last more than 2–4 weeks there is a possibility that the person present PTSD, in other cases symptoms appear only after weeks or months [1].

These symptoms are well described and presented in [2] The Diagnostic and Statistical Manual of Mental Disorders Fifth Edition DSM 5, [3] The International Classification of Diseases (ICD), and [4] The National Institute for Health and Care Excellence Guidelines for PTSD. Re-experiencing symptoms are the most characteristic symptoms that produce suffering. PTSD patients re-experience aspects of the trauma (flashbacks), very often producing a reactivation of the afferent intense emotions (where the patient acts or feels as if the traumatic experience was reoccurring),

Repetitive and intrusive images, nightmares, or other sensorial impressions of the traumatic event may be also re-experiencing. Stimuli of the traumatic event can produce an increase in

the arousal of the physiological reactions. Children may present some peculiarities in re-experiencing the trauma; their symptoms may include also a form of repetitive play or negative dreams without that the child to be able to recognize the content of the dreams.

Avoidance of various stimuli that are in correlation with the trauma is also a very often present PTSD symptom. Stimuli that can produce a re-experiencing of the trauma can be people, situations, or circumstances that are simulating or associated with the traumatic event. Patients often try to intentionally forget memories related to the event and avoid thinking or talking about what happened. Excessive rumination about: the justice of happening such an event to them, about what could they maybe don different in order to prevent to experience such an event, or scenarios about the way they will revenge what they have experience, are also very often.

Hyperarousal and hypervigilance symptoms include threat, startle, irritability, tension, concentration difficulty, and insomnia. Some PTSD patients present symptoms of emotional numbing which include: lack of ability to feel, detached from others, relinquish implication in previously preferred activities, and selective amnesia of the trauma [4].

Mindfulness mechanism is described as involving intention to direct one's attention to the present moment, in a detached and nonjudgmental way that lead to a state of acceptance [5]. Directing attention to the present moment means observing thoughts, feelings, and sensations that lead to developing awareness of the "here and now" [5]. Though focusing on the present in a nonjudgmental way, mindfulness consequently leads to developing an attitude of acceptance, or willingness to experience negative or uncomfortable events [5]. The question is how far Mindfulness has potential to be of benefit to individuals with PTSD?

At this time, the evidence-based treatment interventions presented on the website of The National Institute for Health and Care Excellence and APA Division 12 Society of Clinical Psychology do not include Mindfulness-based psychotherapies. In the following we present how far the evidence-supported therapies could benefit from including Mindfulness.

2. Mindfulness — The "*Third Wave*" in cognitive behavior therapies

Evidence-Based treatments (EBT) for PTSD are Cognitive Processing Therapy [CPT, 6] and Prolonged Exposure [PE, 7]. The efficacy of these techniques in decreasing PTSD symptoms was proven by the many samples of PTSD patients in clinically controlled studies. CPT as well PE encourages the client to recall traumatic events in a controlled setting. Exposure to trauma-related memories, thoughts, and feelings, and cognitive restructuring of the trauma-related dysfunctional beliefs have been considered essential components for an effective treatment of PTSD patients. However, there is an important percentage of population which does not seek help, give up, or refuse the PE treatment because of the expected discomfort during confrontation of the trauma-related stimuli, or because they do not obtain significant results in their cases [5, 8, 9, 10].

Including mindfulness or other emotion regulation techniques in the existing evidence-based treatments protocols for PTSD may improve outcomes in multiple ways such as [5]:

Motivation for the treatment: Mindfulness can be useful for those clients who do not turn to evidence-based treatments or it is hard for them to tolerate the attached discomfort [8, 11, 12]. Mindfulness practice can play a role in decreasing symptoms and may increase the possibility of the clients with low motivation to accept the therapist's recommendations or evidence-based treatments.

Additional or replacing relaxation techniques: Mindfulness can be used prior to exposure or cognitive restructuring. Teaching patients to observe in a nonjudgmental way their internal reactions, feelings, sensations, and thoughts the moment they arise and to accept them can be useful in increasing their tolerance toward unpleasant emotions and discomfort that are associated with the trauma-related stimuli.

Decreasing the level of rumination: In order to increased awareness of trauma-related symptoms, encouraging mindfulness would be useful. Mindfulness may allow patients to decrease the level of rumination by developing detachment and defusion from their intrusive thoughts and feelings. Mindfulness can stimulate acceptance rather than avoidance of the trauma-related situations.

Increasing compliance to EBT: Patients practicing mindfulness during the treatment process may be more willing to follow EBT and accept the attached discomfort.

The “third-wave” cognitive behavioral psychotherapies (third-wave CBT) are defined by incorporating mindfulness training as central intervention technique, which can be clinically relevant also for decreasing traumatic stress. In the scientific literature there is a lack of study on the efficacy of these interventions in PTSD patients. Research has supported the efficacy of the third wave CBTs for various mental health problems such as anxiety, depression, or emotion deregulation that are also commonly present in PTSD [5].

2.1.1. Dialectic Behavior Therapy (DBT)

Linehan [13] describes mindfulness practice as an “instance of exposure to naturally arising thoughts, feelings, and sensations” [p. 354] [13]. Mindfulness skills are taught of as the “core” skills of DBT, and emphasize focused attention and awareness through observing, describing, and participating fully in both public and private experience [13, 14]. DBT often has been used prior to the implementation of PTSD-specific treatments such as exposure-based interventions to address difficulties with emotion regulation and distress tolerance [5].

2.1.2. Acceptance and Commitment Therapy (ACT)

ACT is based on relational frame theory [14, 15], which describes how language produces a unique situation in which direct experience is fused with cognition. In such instances, human beings respond to the literal content of thoughts as “truth” rather than responding to the thought as an experience. For example, thoughts such as “I can’t do this” or “This will never get better” are responded to as reality. This “cognitive fusion” can then lead to efforts to avoid situations or emotions that give rise to these thoughts, or to escape such thoughts at the time

they occur. While some avoidance of private experience may be necessary for healthy functioning and may in fact serve as effective coping [e.g., taking a walk to distract from work-related stress], routine avoidance of unpleasant private experiences may result in increased psychological distress when the avoidance interferes with effective living which often happens in PTSD [14, 15]. Randomized controlled trials are currently underway to evaluate the efficacy of ACT as a stand-alone treatment for PTSD. ACT targets avoidance of thoughts, memories, emotions, and other private experiences. In PTSD, these experiences may include intrusive recollections of the traumatic event and emotional states of guilt or anger [5].

2.1.3. Mindfulness-Based Stress Reduction (MBSR)

Mindfulness-Based Stress Reduction (MBSR) is a group psychosocial intervention consisting of mindfulness meditation practice and gentle yoga stretches that has been applied within chronically ill populations including cancer, with the goal of reducing stress and symptoms of disease [16] that appear also in PTSD. MBSR promote a state of awareness of the “*here and now*” and nonevaluative cognition about the reality. Mindfulness-Based Stress Reduction programs are intended to change automatic thoughts and other cognitive processes which can decrease PTSD symptoms and increase the quality of life [17, 14] of the PTSD patients.

2.1.4. Mindfulness-Based Cognitive Therapy (MBCT)

MBCT [14, 18] is based on an integration of elements of CBT for depression [14, 19], with the components of MBSR [16]. Compared to CBT, the goal of MBCT is not to change the *content* of core beliefs or automatic thoughts, it addresses obtaining a state of *awareness* and *acceptance* of the thoughts, feelings, and bodily sensations that some experience. In other words, its emphasis is primarily on facilitating a high discomfort and promotes ways of thinking like “Thoughts are not facts” and “I am not my thoughts.” Mindfulness Based-Cognitive Therapy might be a useful tertiary care program for patients struggling with PTSD and depression [5].

3. The neuroscience of mindfulness and its implications in PTSD

A systematic review of neurobiological and clinical features of mindfulness meditations [20] shows that studies using Electroencephalographic (EEG) as an objective measurement tool for observing the changes in brainwaves produced by mindfulness meditation have revealed a significant increase in alpha and theta waves during mindfulness practice. Studies using fMRI observed that mindfulness practice activates the prefrontal cortex (PFC) and the anterior cingulate cortex (ACC) and that practicing mindfulness for a long period of time produces an increased activation in attention-related cerebral areas [20].

The clinical findings show that Mindfulness-Based Stress Reduction (MBSR) is effective for different psychiatric and also for different somatic conditions for both healthy and mental disordered subjects [please see table 1], Mindfulness-Based Cognitive Therapy (MBCT) efficacy ways observed predominantly in reducing depression relapses in cases of a history of three or more depressive episodes, Zen meditation produces a significant decreases of

Outcome of interest	Vipassana	Zen	MBSR	MBCT
Psychiatric disorders				
Prevention of depression relapses in MD				++
Reduction of overall depressive symptoms in MD			+	+++
Reduction of anxiety levels in BD				+
Social phobia				+
PTSD	N			
Alcohol and substances dependence	+			
Physical disorders				
Psychological symptoms in cancer			++++	
Reduction of blood pressure		++		
Chronic pain			++	
Rheumatoid arthritis			++	
Fibromyalgia			++	
Psoriasis			+	
Multiple sclerosis			+	
Tinnitus				N
HIV			+	
Healthy subjects				
Stress	+	+	+++++++	

MD, Major depressive disorder; BD, bipolar disorder; PTSD, post-traumatic stress disorder; MBSR, Mindfulness-Based Stress Reduction; MBCT, Mindfulness-based Cognitive Therapy; +, MM better than control condition; N, no significant difference between MM and control condition.

MD, Major depressive disorder; BD, bipolar disorder; PTSD, post-traumatic stress disorder; MBSR, Mindfulness-Based Stress Reduction; MBCT, Mindfulness-based Cognitive Therapy; +, MM better than control condition; N, no significant difference between MM and control condition

Table 1. Clinical findings [20]

hypertension level and the traditional meditation Vipassana [focus on the breath] shows efficacy in reducing alcohol and substance abuse in prisoners. However, given the low-quality designs of current studies, it is difficult to establish whether clinical outcomes are due to specific or non-specific effects of MM (see also table 1) [20].

The implication of amygdala as a quick way to process emotional stimuli of any type of valence is well known. Research has shown a decrease in the amygdala activation level as a response to emotional stimuli, in the moments of practicing mindfulness, after an 8-week meditation training. A recent longitudinal study by Desbordes, Negi, Pace, Wallace, Raison, and Schwartz (2012) [21], investigated the effects of an 8-week mindfulness training on amygdala activation level toward emotion-related stimuli in cases where the participants were in a non-meditative state. Participants included in the study were healthy adults and had no experience in meditation practice. The author used two types of training programs (a) Mindful Attention Training (MAT), (b) Cognitively Based Compassion Training (CBCT; based on Tibetan Buddhist compassion meditation practices) and compared the results also with an active control group.

As pre- and post-intervention assessment, was used an fMRI experiment. The experimenters show the participant's images with three different emotional valences (e.g., positive, negative, and neutral) when there were in a nonmeditative state. They reported a longitudinal decrease in right amygdala activation in the Mindful Attention group as a reaction to all three types of images. In the CBCT group, they reported a trend increase in right amygdala reaction to negative images, and presented a negative correlation with the depression score. The control group presented no modification in the response of the amygdala toward emotional related stimuli's. The results of this study suggest the possibility that the effect of long-term mindfulness practicing on emotions could be extended or generalized also to nonmeditative states. [21].

A recent study made at Durham VA Medical Center from Duke University, published in *Archives of General Psychiatry* [22], have observed a smaller volume of amygdala in the case of war veterans diagnosed with PTSD. Their study provides objective evidence for a positive relation between the volume of amygdala and PTSD. This result offers a promising direction of research, which has the task of establishing if a smaller amygdala is a risk factor and vulnerability to develop PTSD or if it is the other way around. [22].

Translating these findings to PTSD patients, there is a possibility that people who practice mindfulness meditation for a longer period of time could have a higher level to which their amygdala react to outside stimuli, including events with a trauma content. These results could suggest that mindfulness practice could decrease the risk of developing PTSD. An open question is if there exists a relation between the volume and the activation level of amygdala in the case of PTSD.

4. The mechanism of mindfulness

4.1. Measuring and operationalization mindfulness

Studies [23] systematically assess and compare the properties of instruments to measure self-reported mindfulness. Ovid Medline, CINAHL, and PsycINFO databases were searched for articles whose primary purpose was the development or evaluation of the measurement properties (validity, reliability, and responsiveness) of a self-report mindfulness scale [23]. They identify 46 articles that met the inclusion criteria of their study, describing 10 scales which operationalized mindfulness as a: (a) unidimensional process or (b) bi-dimensional or multidimensional process. From the unidimensional scales The Mindful Attention Awareness Scale (MAAS) was described by most studies and presented positive psychometric properties. From the multidimensional scales The Five Facet Mindfulness Questionnaire had presented highest internal consistency and construct validation [23]. From the revised scales no one had presented sufficient evidence for a significant content validity. The studies describing the mindfulness scales did not assess the level to which the measurements cover all the aspects of the mindfulness concept or the level of the comprehensiveness of the items by the subjects. One reason for these omissions could be also the differences in the scientific literature regarding the definition of the mindfulness concept. Another limitation of the validation studies for

the revised scales was errors in the estimation of (a) test-retest reliability estimation, and (b) guidelines for the interpretation of scores in the cases of measurement errors were missing.

By the authors revised mindfulness measurements [23] have important differences and defining and operationalizing mindfulness, and no scale present enough content validity in order to be recommended only by their superior psychometric properties. The significant limitations identified are due to the absence of qualitative evaluations and accepted external referents to sustain construct validity. Researcher using mindfulness-based intervention programs in their clinical controlled trials studies need to be aware that based on the existing measurements it could be difficult to optimize mindfulness intervention programs [23].

The MAAS assesses awareness of present experience throughout daily life presenting a single factor after exploratory and confirmatory factor analysis [24–26]. The Five-Factors Mindfulness Questionnaire (FFMQ) [13] operationalize mindfulness using a multidimensional conceptualization, using subscales for different attention, cognitive, and behavioral processes present during practicing mindfulness, like: (a) observing, (b) describing, (c) acting with awareness, (d) acceptance without judgment, and (e) nonreactivity to inner experience. Other bi-dimensional or multidimensional mindfulness scales are: (a) The Cognitive Affective Mindfulness Scale - Revised (CAMS-R) [27], (b) the Philadelphia Mindfulness Scale (PHMS) [28], and (c) the Freiburg Mindfulness Inventory (FMI) [29]. These scales assess the level of individual's long-term awareness of the present experience/moment or in other words, mindfulness as a trait [4]. Philadelphia Mindfulness Scale [28] present two mindfulness factors: [a] tendency to be aware of the present experience over time, and [b] tendency to accept the present experience [28].

In a recent study we have analyzed the relation between the two ways of conceptualization Mindfulness: as a one-dimensional versus a two-dimensional process, respective the relationship between the mindfulness measurements and anxiety, depression, optimism, pessimism and unconditional self-acceptance. For this propose we have used The Mindful Attention Awareness Scale (MAAS) and Philadelphia Mindfulness Scale (PMS).

According to the scientific literature [13, 15, 30, 31, 36] we expected that mindfulness will correlate positively with optimism and unconditional self-acceptance and correlate negatively with anxiety, depression, and pessimism. The results confirmed our hypothesis for the one-dimensional mindfulness measurement (MAAS). The two Mindfulness measurements presented a low to medium relation ($r=.433$ at $p=.001$ between MAAS and PMI awareness, and $r=.326$ at $p=0.001$, $N=112$ between MAAS and PMI acceptance). Mindfulness measurement as a two-dimensional concept presented no relationship between: (a) mindfulness awareness and (b) mindfulness acceptance scales, respective optimism and unconditional self-acceptance. Mindfulness awareness scale (PMI awareness) presented a negative relationship with pessimism ($r=-.310$ at $p=0.001$, $N=112$) and a low positive relationship with unconditional self-acceptance ($r=.190$ at $p=0.05$, $N=112$), respective no relationship with anxiety and depression measurements. The Mindfulness acceptance scale (PMI acceptance) presented a negative relationship with anxiety ($r=-.325$ at $p=0.001$) and depression ($r=-.474$ at $p=0.01$), and no relationship with other measured variables. Besides optimism and unconditional self-acceptance, the two dimensional Mindfulness measurements PMI confirm the hypothesis.

Concluding, the main difference between the two measurements seems to be at the cognitive level, [optimism--pessimism scale, unconditional self-acceptance] suggesting one conceptualize mindfulness more as a cognitive process of attention and the other measurement more as nonevaluative detachment. Our results confirm the conclusion of the study conducted by Park, Reilly-Spong, and Gross, (2013) [23] that current mindfulness scales have important conceptual differences and important limitations and that researchers need to proceed cautiously before optimizing any mindfulness intervention based on the existing scale [23].

4.2. The Influence of Mindfulness on PTSD Cognitive Processes

4.2.1. Mindfulness, memory, and attention

A study conducted by Lykins, Baer, and Gottlob, (2012) [32] compared the results at performance-based attention tests, respective short-term and long-term memory measurements, between a group of long-term meditators and a group of persons which didn't have previous meditation training or practice. The meditators included in the study had practice mindfulness meditation in a regular way for of least 6 years. As expected, the results showed significantly higher scores at mindfulness scales for the meditator's group. The results showed little difference between the two groups regarding the performance-based tasks measured in the study. The differences between the two groups were significant only between the short- and long-term memory scores [32].

There results indicated that the two groups scored significantly differently on these measures: (a) California verbal learning test (CVLT) and (b) letter-number sequencing (LNS0. Follow-up univariate ANOVAs revealed that, as predicted, meditators scored significantly higher on two measures of short-term memory (CVLT short delay free recall, short delay cued recall) and one measure of long-term memory (long delay free recall). Contrary to predictions, they did not score higher on a second index of long-term memory (long delay cued recall), working memory, or total learning. Mean effect size for this group of variables was 0.49 [32].

No differences in sustaining attention between mindfulness intervention group and controlled groups were presented. In other studies on sustained attention, MacCoon MacLean, Davidson, Saron, Lutz (2014) [33] have done a longitudinal randomized trial comparing the study between MBSR versus active control group, which participated in a Health Enhancement Program (HEP). They have found no significant correlations between performance change and either total minutes of practice or sessions of practice from pre- to post-intervention [33]. Attentional sensitivity is not affected by mindfulness practice as taught in MBSR, but it is unclear whether mindfulness might positively affect another aspect of attention, vigilance [33].

This findings suggest that mindfulness could be used in the case of PTSD patients in at least two ways: (a) in addition to using mindfulness as a relaxation method before Prolonged Exposure [PE, 7], it may also increase the ability to recall the exposure experiences in order to consolidate the operant conditioning process, (b) for the category of PTSD patients who tend to avoid recalling traumatic events necessary for Cognitive Processing Therapy [CPT, 6].

4.2.2. *Mindfulness and acceptance*

In a study that analyzed the relationship between mindfulness, acceptance, and catastrophizing in chronic pain [34], the results showed a significant positive strong relation between (a) mindfulness and acceptance, $r(85) = 0.52$, $p < 0.001$; (b) pain-related catastrophizing beliefs and acceptance ($r(82) = 0.42$, $p < 0.001$).

These results suggest that increasing the level of acceptance could produce a decrease in the levels of pain-related catastrophizing beliefs. The findings show no relation between pain-related catastrophizing beliefs and mindfulness.

The subjective intensity of the pain experience presented a positive significant relation only with pain-related catastrophizing beliefs ($r(82) = 0.40$, $p < 0.001$), suggesting that the eventual benefits of mindfulness or acceptance on reducing the intensity of the subjective pain experience intensity could be mediated through changing pain-related catastrophizing thoughts. Thus, acceptance explained an additional 12% of the variance in pain-related catastrophizing, but mindfulness was not a significant predictor of pain-related catastrophizing. This study has used the acceptance and action questionnaire (AAQ II) developed by Hayes [34, 35] as a measurement of acceptance and the MAAS as a measurement of mindfulness. Other studies [46] found a significant relationship between the unconditional self-acceptance and mindfulness scale MAAS ($r = .31$, $p = .001$), and between the unconditional self-acceptance and the mindfulness scale CAMS-R ($r = .45$, $p = .001$). This study has used the unconditional self-acceptance questionnaire (USAQ) as an acceptance measurement.

These findings suggest that acceptance is related to mindfulness, but clearly distinct from the construct of mindfulness [24, 37]. In contrast to this view other researchers present acceptance as a necessary component of mindfulness [16, 37]. This debate suggests the need for future research to study whether acceptance is a result of mindfulness or is it an independent concept.

4.3. Mindfulness versus hypnosis, traditional meditation, and relaxation

4.3.1. *Mindfulness and hypnosis*

Mindfulness can be easily integrated with hypnotherapy in the management of emotional disorders. Mindfulness-Based Cognitive Hypnosis (MBCH) describes an intervention framework on changing and reframing dysfunctional, irrational, and core beliefs. MBCH includes the following components: (1) intention, (2) direct attention on the present moment, (3) the development of a detached attitude (nonevaluative, non-judgmental) toward the present experience, and (4) the acceptance of the reality with the entire being. In the therapeutic process all these four components are addressed and developed using different types of intervention from education and training in the prior stage of the intervention, to incorporating them into the hypnotherapy strategy [38].

Yapko (2011) [39] provides an excellent discussion on the similarities and differences between hypnosis and mindfulness and the rationale for integrating hypnotherapy with mindfulness techniques. Lynn, Das, Hallquist, and Williams (2006) [40] have proposed that "hypnosis and mindfulness-based approaches can be used in tandem to create adaptive response sets and

ameliorate maladaptive response sets” (p. 145). Moreover, hypnosis can be used to catalyze mindfulness-based approaches [39–41]. Hypnosis can also be used as a substitute for relaxation techniques [38]. Although most of the techniques described are scientific and evidence based, there is a need to study the effectiveness of cognitive hypnotherapy when it is combined with mindfulness [38].

4.3.2. *Mindfulness and traditional meditation*

In a recent study, the authors [42] compared how neurophysiologic (EEG, EKG) and cognitive correlates to meditative practices that use (a) focused or (b) distributed attention, from both Theravada and Vajrayana traditions [42].

The study used two ways of Theravada meditation practice:

Shamatha practice relates to training in the concentration of attention. During the practice of Shamatha, the practitioners are instructed to place undistracted attention on the object of meditation, while withdrawing their focus from other objects [42, 43]. Shamatha meditation, which is similar to the Vipassana method, uses the meditators’ breath as the meditation object. So far the focus of attention/awareness moves from the breathing, the mediators are instructed to observe the new focus of their attention (beliefs, flashbacks, memories, etc.), and to move the focus of attention back to their breath [42, 44]— focused attention.

Kasina meditation is a particular type of Shamatha practice. Kasina meditation refers to objects of meditation that are typically colored disks, which differ from each other in terms of their color, size, object composition, and other properties, depending on the type of Kasina used. In the study [42], Kasina was used instead of the more popular Shamatha practice where a meditator focuses on the breath for a long period of time [44] to dissociate it more easily from Vipassana, which implements focusing on the breath [42]—distributed attention.

Both of these traditional meditation practices overlap highly with the mindfulness practice incorporated in the “third wave” cognitive behavioral psychotherapies. Focusing on the breath or on a specific object, for example, one’s own hand, is also well described in accepted and dedicated therapy textbooks [15, 30].

The study also presented two steps of Vajrayana practices:

Deity meditation involves a visualization practice by generating an internal image of oneself as a supernatural being. The mediators must create an internal image full of details including: colors, ornaments, and environment in a three-dimensional way, respective body image, emotions, and feelings of the supernatural being. This image has the role to replace the perception of the real world or of the self. This visualization is the first stage of the Vajrayana meditation practice [42]—focused attention.

Rig-pa meditation is the second stage of the Vajrayana meditation practice and is develop to be complete the meditation stages [42, 45]. The main goal of the Rig-pa meditation is to develop a state of emptiness and awareness without a conceptualization of the reality. In order to transit from Deity to Rig-pa the meditators visualize the dissolution of the initial visualization. Rig-pa meditation presumes distributive attention without any focus on objects or experiences.

While Rig-pa is considered to be a meditation without an object, Vispassana is considered a meditation which is focused on an object, noticing and observing the content of attention [42, 45]—distributive attention.

This type of traditional meditation practices differ in a significant way from mindfulness meditation that is incorporated in psychology.

The results [42] show that the meditation techniques of the Theravada tradition produced an increased activation of the parasympathetic nervous system, which is an indication for a relaxation response. In contrast, the meditation techniques of the Vajrayana tradition produced an increased activation of the sympathetic nervous system, which is an indication for arousal [42]. These results also pointed out that: (a) Theravada and Vajrayana meditations are based on different neurophysiologic mechanisms, which give rise to either a relaxation or arousal response. (b) That it may be more appropriate to categorize meditations in terms of relaxation vs. arousal, rather than as focused vs. distributed attention dichotomy [42].

4.3.3. *Mindfulness and relaxation training*

A random controlled trial study compared the effect of mindfulness meditation versus relaxation training on distress, positive state of the mind, rumination, and distraction [46]. The relaxation training integrates primarily body awareness--based relaxation intervention: (a) autogenic relaxation, (b) progressive muscle relaxation, (c) simple breathing techniques, and (d) guided imagery to give a comprehensive course on stress reduction via a focus on bodily relaxation.

The results show a large effect sizes on reduction of distress for both meditation and relaxation (Cohen's $d = 1.36$ and $.91$, respectively), whereas the meditation group showed a larger effect size for positive states of mind than relaxation (Cohen's $d = .71$ and $.25$, respectively). There was no significant difference between meditation and relaxation on distress and positive mood states over time. The meditation group also demonstrated significant pre and post decreases in both distractive and ruminative thoughts/behaviors compared with the control group, with mediation models suggesting that the mindfulness meditation's effects on reducing distress were partially mediated by reducing rumination.

5. Conclusions and discussions

The analyzed researches suggest that mindfulness may improve the therapeutical results and the outcome of PTSD patients. Mindfulness can be used in two ways: (a) as an emotion regulation support technique for existing empirically supported PTSD treatments, and (b) as a standalone treatment—mindfulness-based cognitive behavior psychotherapies (ACT, DBT, MBSR, MBCT, etc.).

Otherwise, the term mindfulness is used often for different meditative techniques, which are incorporated in psychology, but are differently named in the traditional meditation approaches. These facts indicate the need to use neuroscience research techniques (EEG, fMRN)

to obtain a clear image of the neurophysiologic and psychological processes implicated in different types of mindfulness exercises. Based on the presented research it seems that there are different ways of conceptualizing and assessing mindfulness in measuring the efficacy of treatment, which brings us to inconsistent and incomparable results. However, before definitive conclusions can be drawn about the efficacy of mindfulness in the treatment of PTSD, further basic and applied research is needed [5].

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Author details

Delia M. Podea^{1,2*} and Karol J. Wild^{1,3}

*Address all correspondence to: deliapodea@yahoo.com

1 “Vasile Goldis” Western University of Arad, Psychiatry Department, Arad, Romania

2 Psychiatry Department, County Clinical Emergency Hospital of Arad, Arad, Romania

3 “VasileGoldis” Western University of Arad, Psychology Department, Arad, Romania

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