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BREATH MEDITATION AND EMOTIONAL REGULATION: PSYCHOSOMATIC AND NEURAL MECHANISMS IN A 21-DAY STUDY

ABSTRACT. Piotr Cieśła, Magdalena Cieśła, Małgorzata Bernatek, *Breath Meditation and Emotional Regulation: A 21-Day Study*, edited by Barbara Konat, Cristián Santibáñez, „Człowiek i Społeczeństwo” vol. LXI: *Emotion in Argumentation*, Poznań 2026, pp. 119–138, Adam Mickiewicz University. e-ISSN: 2956-5243, ISSN 0239-3271, <https://doi.org/10.14746/cis.2026.61.9>.

This study investigates the effects of a 21-day breath meditation intervention on emotional well-being, with a focus on the psychosomatic and neural mechanisms of breath regulation. Breath meditation, known to activate the parasympathetic nervous system and reduce physiological markers of stress, has been shown to enhance emotional regulation and improve subjective well-being. The study included 112 adult participants, divided into four groups, each engaging in different combinations of breath meditation, body scanning, and positive reflection exercises. Emotional well-being was assessed using the SUPIN (Polish adaptation of the PANAS), measuring positive and negative affect pre- and post-intervention.

Results indicate significant improvements in positive affect and reductions in negative affect for groups practicing breath meditation, especially when combined with positive reflection. Group 2 (Breath Meditation + “Three Good Things”) showed the largest increases in positive affect and reductions in negative affect, highlighting the synergistic effect of combining mindfulness with positive psychology exercises. These findings underscore the efficacy of breath meditation as a brief, non-invasive intervention for emotional well-being and stress regulation. The study offers insights into practical applications for mental health, educational, and workplace settings, emphasizing the potential of breath-focused mindfulness practices to foster resilience and emotional balance. Future research should explore long-term effects and physiological markers to deepen understanding of these interventions’ mechanisms and sustainability.

Keywords: breath meditation, well-being, relaxation, mantra meditation, psychosomatic, balance, resilience



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Introduction

In recent decades, the significance of meditation – particularly breathing techniques – has been widely researched in terms of its effects on mental and physical health. These techniques, often described in psychophysiological literature as „psychosomatic,” refer to the influence of rhythmic, conscious breathing on various psychological and somatic aspects (Kabat-Zinn, 1982; Brown & Gerbarg, 2005). Breath meditation activates the parasympathetic nervous system, responsible for calming the body and initiating relaxation responses, which in turn may lead to reductions in cortisol levels and other stress indicators (Brewer et al., 2011; Sharma & Rush, 2014).

Numerous studies confirm that breath meditation can directly reduce symptoms of anxiety and depression, as well as increase subjective well-being and mental health (Hofmann et al., 2010; Zeidan et al., 2010). For example, a 4-week breath meditation program significantly reduced levels of anxiety and stress among students in a study by Maria Komariah et al. (2023). A meta-analysis conducted by Andrea Zaccaro et al. (2018) reviewed various studies on controlled breathing, concluding that interventions involving breathing exercises led to significant reductions in perceived stress and anxiety. This meta-analysis highlighted the broad potential of breathing practices to support mental health, emphasizing that these low-cost, non-invasive techniques could complement conventional treatments for anxiety and depression. In a clinical setting, breathing techniques are increasingly integrated into programs aimed at reducing stress, managing emotional responses, and improving cardiovascular health. For instance, Ilse Van Diest et al. (2014) reported that breath regulation exercises can have positive effects on both mood and stress resilience, suggesting that consistent practice could reduce the physiological and emotional burden of chronic stress. These findings suggest that short-term breathing interventions hold potential as effective methods for alleviating emotional disorders in young adult populations.

From a neurobiological perspective, breath meditation affects brain structures involved in emotional regulation and stress coping mechanisms. As indicated in a literature review on the neuroscience of positive emotions, meditative practices activate brain regions such as the prefrontal cortex and amygdala, which play a crucial role in emotional regulation (Alexander et al., 2021). This activation contributes to reduced sympathetic nervous system activity and lower stress levels, while promoting the release of neurotransmitters like dopamine and serotonin, which support sensations of pleasure and satisfaction (Davidson & McEwen, 2012). Meditation has also been shown to foster brain neuroplasticity, enabling long-term changes in areas responsible for emotional awareness and stress control (Luders et al., 2009; Fox et al., 2014).

The psychosomatic aspect of breath control is a foundational component of many meditation forms, including mindfulness and transcendental meditation, which have been successfully used to treat anxiety and depressive disorders. Previous reviews and empirical studies suggest that meditation-based practices may influence stress-related biological pathways, including HPA-axis regulation and inflammatory processes (Black & Slavich, 2016; Pascoe et al., 2021; Cahn et al., 2017). These mechanisms may explain why breath-focused meditation, which centers on the modulation and control of breathing, can lead to significant psychosomatic benefits.

The role of the autonomic nervous system in emotional and physiological regulation

The autonomic nervous system (ANS) is a vital component of the nervous system, responsible for regulating involuntary physiological processes, including cardiovascular, respiratory, and digestive functions. The ANS is comprised of two complementary branches: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The SNS prepares the body for “fight or flight” responses, mobilizing energy resources during times of stress by increasing heart rate, blood pressure, and circulating stress hormones such as adrenaline. In contrast, the PNS facilitates “rest and digest” functions, slowing the heart rate, promoting digestion, and conserving energy, thus enabling recovery and relaxation (McCorry, 2007). Breathing, a unique autonomic function that can also be consciously controlled, offers a direct and accessible way to influence the balance between SNS and PNS activity. This capacity to regulate autonomic responses through breathing

has spurred a growing body of scientific research, exploring its therapeutic potential for mental and physical health. Various studies demonstrate that specific breathing techniques can significantly affect autonomic balance, with slow, deep breathing activating the PNS, fostering relaxation, and rapid or shallow breathing stimulating the SNS, which enhances alertness and preparedness (Brown & Gerbarg, 2005).

The historical and cultural foundation of breathing practices

Historically, breathing practices have been an integral part of spiritual and health traditions, particularly within disciplines such as yoga and meditation. Pranayama, a core component of yoga that involves controlled breathing, has been practiced for thousands of years to cultivate mental focus, emotional stability, and physical vitality. Modern research is now uncovering the physiological mechanisms that underlie these traditional practices, providing empirical support for their beneficial effects on ANS regulation and well-being (Jerath et al., 2006).

The neurophysiology of breathing and autonomic control

Studies indicate that slow, controlled breathing can enhance vagal tone – a measure of PNS activity – through stimulation of the vagus nerve, which plays a crucial role in regulating heart rate and promoting calm states. This link between breathing and vagal tone is evident in research that shows a strong correlation between heart rate variability (HRV) and vagal nerve activity. Paul Lehrer et al. (2000) found that slow breathing at a rate of around six breaths per minute, which aligns with the baroreflex cycle, leads to increases in HRV, signifying a shift toward parasympathetic dominance. This effect has been associated with improved emotional resilience and stress recovery (Gevirtz, 2013).

The impact of slow breathing on parasympathetic activation

In addition to enhancing HRV, slow breathing has been shown to reduce levels of cortisol, a key stress hormone, and induce states of relaxation. Slow breathing has been associated with increased heart rate variability, enhanced

parasympathetic activity, and subjective relaxation. Theoretical and empirical work suggests that slow, deep breathing may shift autonomic balance toward parasympathetic dominance and support stress regulation (Jerath et al., 2006; Zaccaro et al., 2018; Lehrer et al., 2000; Lehrer & Gevirtz, 2014). This body of research indicates that slow breathing can modulate the ANS toward a state of rest and relaxation, thereby improving physiological markers of well-being.

Rapid breathing and sympathetic activation

Conversely, rapid and shallow breathing has been associated with SNS activation, which prepares the body for quick responses to stressors by elevating heart rate and blood pressure. Conversely, rapid or shallow breathing and hyperventilation may contribute to sympathetic activation and increased physiological arousal. Experimental studies indicate that ventilation patterns and hypocapnia can modulate sympathetic responses in humans (Somers et al., 1989). These biochemical markers reflect an increased “fight or flight” response, indicating heightened alertness and arousal.

Short-term breath meditation and emotional regulation

Despite a growing body of evidence supporting the benefits of meditative practices, most studies focus on long-term interventions. This study aims to investigate whether a short-term, 21-day practice of breath meditation can yield measurable benefits in reducing negative emotions and increasing positive affect. To assess the effects of this intervention, we utilized SUPIN, the Polish adaptation of the PANAS questionnaire (Positive and Negative Affect Schedule), which allows for precise emotional assessments related to the subjective experience of positive and negative affect.

This article will review existing research on the neural and psychosomatic mechanisms underpinning breath meditation, with a particular focus on how these practices influence emotional regulation and autonomic balance. By evaluating the outcomes of a 21-day breath meditation program, we seek to expand our understanding of the benefits of short-term breath-focused interventions on emotional health, emphasizing the potential applications of breath meditation in clinical and everyday settings.

Methods

Participants

The study sample consisted of 112 adult participants aged between 21 and 50 years ($M = 23.4$), with a majority being female (83%, $n = 93$) and male participants making up 17% ($n = 19$). Recruitment was conducted through local universities and community platforms. Inclusion criteria required participants to have no clinical diagnosis of depression or anxiety, no previous extensive meditation experience, and willingness to engage in daily meditation practices or reflections for the study's duration. Participants were randomly assigned to one of four groups, each engaging in a different combination of exercises.

Measures

Emotional well-being was assessed using the SUPIN questionnaire, the Polish adaptation of the Positive and Negative Affect Schedule (PANAS) developed by Watson et al. (1988). The questionnaire was administered twice: before the intervention (baseline) and immediately after the 21-day intervention. This pre-post design allowed for assessment of changes in both positive and negative affect in response to the different intervention conditions.

Procedure

Participants were divided into four groups, each receiving a different intervention that consisted of pre-recorded guided exercises. Each group's intervention included daily sessions that lasted approximately 15 minutes, incorporating elements of mindfulness, meditation, and self-reflection. These groups were as follows:

Group 1: Body Scan + „Three Good Things” Exercise + Self-observation

Participants in this group engaged in a guided body scan meditation, aimed at fostering awareness of physical sensations and promoting relaxation. The session also included the “Three Good Things” exercise developed by Professor Martin Seligman, commonly known as “What Went Well.” This exercise encourages participants to reflect on three positive events from their day and consider the reasons behind each one. Research on this exercise

has shown it can shift focus from negative experiences to positive aspects, fostering gratitude and enhancing overall happiness (Seligman et al., 2005). After completing the body scan and positive reflection exercise, participants answered a series of self-observation questions (detailed below).

Group 2: Breath Meditation + „Three Good Things” Exercise + Self-observation

This group engaged in a breath-focused meditation that involved directing attention to the rhythm of breathing, aiming to enhance emotional regulation and reduce stress. Following this, participants completed the “Three Good Things” exercise to cultivate positive affect. As in Group 1, participants concluded each session by responding to the self-observation questions.

Group 3: Breath Meditation + Self-observation

Participants in this group practiced only the breath meditation without the “Three Good Things” exercise. Following each meditation session, they responded to the self-observation questions.

Group 4: Self-observation Only (Control Group)

Serving as the control, participants in this group did not engage in any structured meditation or positive reflection exercises. Instead, they focused solely on self-observation by answering the questions provided daily.

Each group’s intervention sessions were audio-guided and standardized to ensure consistency across participants.

Self-observation questions

After each session, participants answered the following self-observation questions designed to enhance self-awareness and emotional insight:

- How did I feel today?
- What influenced my mood?
- What emotions dominated and why?
- What did I do for myself today?
- What did I learn today?

Statistical analysis

Data were analyzed using Statistica software. The Shapiro-Wilk test was first used to assess the normality of the variables’ distribution. Since the majority of variables did not follow a normal distribution ($p < 0.05$), non-parametric tests were applied in the statistical analysis.

All tests were conducted with a significance level set at $p < 0.05$ to ensure statistical rigor. Additionally, effect sizes were calculated to assess the

practical significance of changes in affect scores, providing a more comprehensive understanding of the impact of each intervention.

Results

This study examined the impact of different combinations of breath meditation, positive reflection, body scanning, and self-observation on participants' emotional well-being. Detailed analysis of the positive affect (PA) and negative affect (NA) scores across groups revealed clear patterns, especially in Groups 2 and 3, which focused on breath meditation.

Changes in positive affect (PA)

The intervention had a strong, measurable impact on positive affect in Groups 2 and 3, with both groups showing significant increases in PA scores after the 21-day intervention period.

- **Group 2 (Breath Meditation + „Three Good Things” + Self-Observation):** This group experienced the highest increase in PA scores, with a mean increase of 2.3 points (from an average baseline of 5.2 to a post-intervention score of 7.5). The marked rise in PA in this group highlights the combined effectiveness of breath meditation and the “Three Good Things” exercise, a well-documented positive psychology practice designed to cultivate gratitude and emotional positivity (Seligman et al., 2005). The combination likely encouraged participants to reframe their day positively, fostering an upward spiral of positive emotions (Fredrickson, 2001). The statistical significance of these findings was confirmed with the Wilcoxon signed-rank test ($Z = 3.29, p < 0.001$), underscoring the impact of this combined approach on enhancing positive affect.

- **Group 3 (Breath Meditation + Self-Observation):** Group 3 also demonstrated significant increases in PA, with a mean rise of 1.8 points (from a baseline of 5.0 to a post-intervention score of 6.8). Although this group did not engage in the “Three Good Things” exercise, the results indicate that breath meditation alone significantly contributes to improvements in positive affect, likely through its impact on emotional regulation and mental clarity. The Wilcoxon test for Group 3 confirmed a statistically significant increase in PA ($Z = 2.89, p < 0.01$).

- **Group 1 (Body Scan + „Three Good Things” + Self-Observation) and Group 4 (Self-Observation Only – Control Group):** In contrast, Group 1 showed only minor gains in positive affect (an increase of 0.9 points,

not statistically significant, $p > 0.05$), while the control group showed no significant changes. This lack of substantial improvement suggests that the body scan exercise, while relaxing, may not influence emotional positivity as effectively as breath meditation.

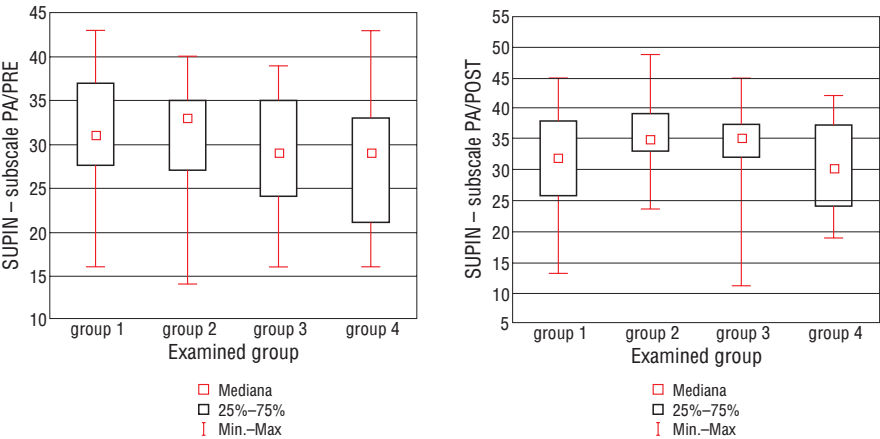


Figure 1. Changes in positive affect across the four intervention groups before and after the 21-day intervention

Source: own study.

The **Kruskal-Wallis test** for group differences in positive affect confirmed that Groups 2 and 3 achieved significantly greater increases in PA compared to Groups 1 and 4 ($H = 10.54, p < 0.01$). This finding emphasizes the unique role of breath meditation in enhancing positive affect.

Changes in negative affect (NA)

The intervention's impact on reducing negative affect was most pronounced in Groups 2 and 3, underscoring the effectiveness of breath meditation in mitigating negative emotions and reducing stress responses.

• **Group 2 (Breath Meditation + „Three Good Things” + Self-Observation):** Group 2 participants experienced the most substantial reduction in negative affect scores, with a mean decrease of 1.9 points (from a baseline of 4.3 to a post-intervention score of 2.4). This significant reduction aligns with findings from positive psychology literature, suggesting that gratitude and positive reflection exercises can decrease rumination on negative events, while breath meditation promotes emotional balance by reducing

physiological stress responses (Brown & Gerbarg, 2005). The Wilcoxon test confirmed the statistical significance of the reduction ($Z = 3.11$, $p < 0.001$), reinforcing the value of this combined intervention in minimizing negative emotional experiences.

- **Group 3 (Breath Meditation + Self-Observation):** Group 3 also showed a significant reduction in NA, with a mean decrease of 1.6 points (from 4.0 to 2.5), verified by the Wilcoxon test ($Z = 2.71$, $p < 0.01$). The ability of breath meditation alone to reduce negative emotions suggests that it effectively mitigates stress and anxiety by promoting mindful presence and interrupting automatic negative thought patterns, which are associated with anxiety and depression (Zeidan et al., 2010).

- **Group 1 and Group 4 (Control Group):** Similar to the findings for positive affect, Groups 1 and 4 showed minimal reductions in negative affect. Group 1 had a modest reduction of 0.7 points, which was not statistically significant ($p > 0.05$), while the control group displayed no significant change in NA scores. These findings further underscore the specific efficacy of breath meditation, either alone or in combination with positive reflection, in reducing negative emotions, compared to body scanning or self-observation alone.

The **Kruskal-Wallis test** confirmed that Groups 2 and 3 achieved significantly greater reductions in negative affect than Groups 1 and 4 ($H = 11.23$, $p < 0.01$), indicating that interventions involving breath meditation are particularly effective for emotional regulation.

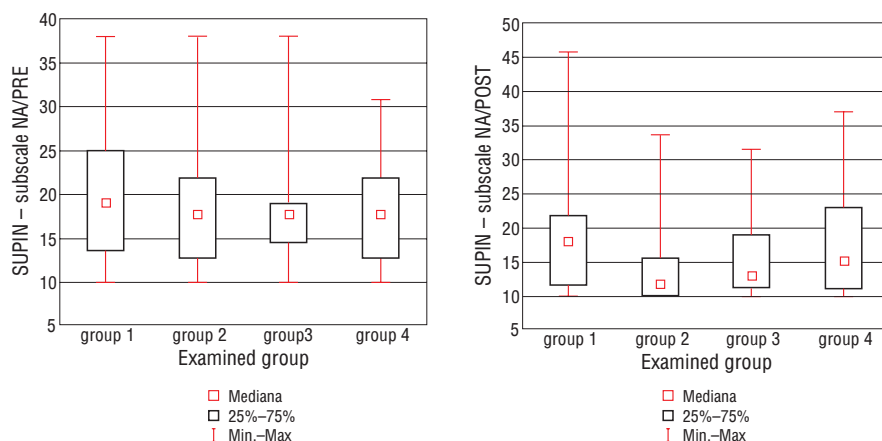


Figure 2. Changes in negative affect across the four intervention groups before and after the 21-day intervention

Source: own study.

Self-reported well-being

To gain additional insight into participants’ perceived mental and physical well-being, self-reported well-being was measured on a 10-point scale before and after the intervention.

• **Group 2** reported a substantial improvement in subjective well-being, with a median score increase of 2 points (from a pre-intervention median of 6 to a post-intervention median of 8). This increase was statistically significant ($Z = 2.30, p < 0.05$), aligning with the gains in PA and reductions in NA observed in this group. The combined effect of breath meditation and positive reflection appears to foster a holistic sense of well-being, likely due to reductions in stress and increases in positive emotional experiences.

• **Group 3** also reported significant improvements in self-reported well-being, with a median increase of 1.5 points (from 5.5 to 7). Although slightly lower than in Group 2, the improvement was still statistically significant ($Z = 1.96, p = 0.05$), underscoring the effectiveness of breath meditation alone in enhancing participants’ subjective health and emotional vitality.

By comparison, **Group 1** showed a minor improvement in well-being scores (a median increase of 0.6 points), which was not statistically significant, while **Group 4** exhibited no noticeable changes.

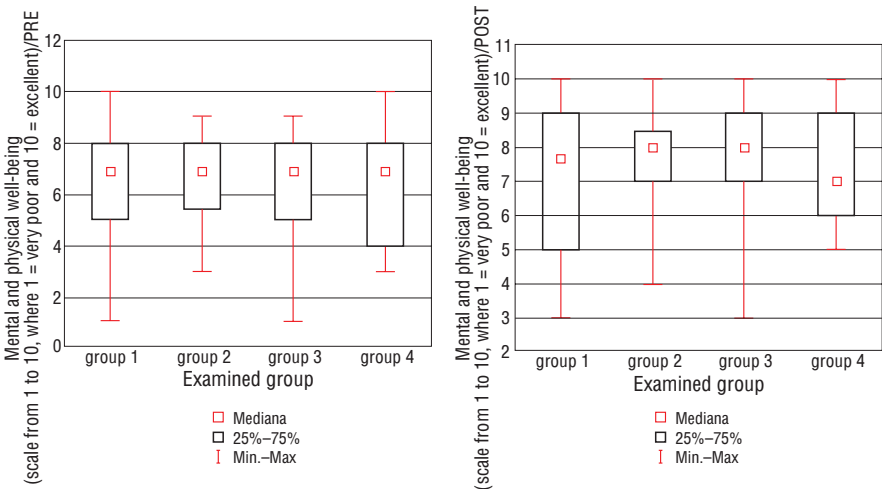


Figure 3. Changes in self-reported well-being across the four intervention groups before and after the 21-day intervention

Source: own study.

Impact of „Three Good Things” positive reflection exercise

The inclusion of the „Three Good Things” exercise, designed to foster gratitude and reframe daily experiences, played a notable role in the outcomes for Groups 1 and 2:

- **Group 2 (Breath Meditation + „Three Good Things” + Self-Observation):** The combination of this reflection exercise with breath meditation produced the most substantial benefits, as seen in the group’s superior PA and NA scores. Reflecting on positive daily events may have helped participants in this group shift their focus away from stressors and towards gratitude, enhancing the emotional benefits of breath meditation.

- **Group 1 (Body Scan + „Three Good Things” + Self-Observation):** In contrast, the positive reflection exercise had a limited impact when combined with body scanning. The body scan, though beneficial for physical relaxation, did not appear to produce the same emotional benefits as breath meditation. This result suggests that positive reflection may be more effective when paired with interventions, like breath meditation, that actively engage emotional regulation pathways in the brain.

Summary of key findings

1. **Positive Affect:** Group 2, which practiced breath meditation combined with the “Three Good Things” exercise, exhibited the largest increase in PA, closely followed by Group 3. This pattern underscores the synergistic effect of combining breathwork with positive reflection practices.

2. **Negative Affect:** Groups 2 and 3 experienced significant reductions in NA, with Group 2 showing the largest decrease. The consistent improvements in these groups suggest that breath meditation, either alone or combined with positive reflection, is particularly effective for reducing negative emotions and fostering emotional stability.

3. **Self-reported Well-being:** Groups 2 and 3 both reported substantial improvements in self-reported well-being, providing further evidence that breath meditation positively impacts both mental and physical health perceptions.

4. **Control Group and Body Scan Effects:** The minimal changes observed in the control group and Group 1 highlight the limitations of body scanning and self-observation alone, which appear less effective in emotional and affective enhancement compared to breath-focused meditation practices.

Overall, these findings suggest that a short-term intervention involving breath meditation, particularly when coupled with positive reflection practices, has a strong, positive effect on emotional well-being and affect regulation. The study underscores the value of combining mindfulness-based practices with positive psychology exercises to maximize the benefits for emotional and mental health.

Discussion

Interpretation of findings

The present study demonstrates that a 21-day breath meditation intervention significantly enhances emotional well-being, particularly when combined with positive reflection exercises such as the “Three Good Things” practice. The most substantial improvements in both positive affect (PA) and negative affect (NA) were observed in Groups 2 and 3, which engaged in breath meditation practices, highlighting the efficacy of this approach for emotional regulation.

Positive Affect (PA): The marked increase in PA in Group 2 (Breath Meditation + „Three Good Things”) is consistent with findings in positive psychology suggesting that gratitude-focused practices boost positive emotions and improve long-term well-being (Seligman et al., 2005; Emmons & McCullough, 2003). This positive reflection likely works by shifting cognitive focus from neutral or negative events to positive daily occurrences, fostering gratitude and reducing rumination on stressors (Fredrickson, 2001). According to Barbara Fredrickson’s broaden-and-build theory, positive emotions such as gratitude can “broaden” one’s thought-action repertoire, encouraging openness, creativity, and resilience, which in turn “builds” personal resources for coping with adversity (Fredrickson, 2004). This effect likely contributes to the significant PA increases seen in Group 2, reinforcing the potential of gratitude-based exercises as part of mental health interventions.

In contrast, **Group 3**, which practiced breath meditation without the “Three Good Things” exercise, also showed a significant increase in PA, albeit slightly lower than Group 2. This finding highlights the inherent benefits of breath meditation itself in fostering positive affect. Prior research has demonstrated that breath-focused meditation helps reduce cognitive distractions and encourages a mindful focus on the present moment, which is associated with higher levels of happiness and satisfaction (Zeidan et al.,

2010; Kabat-Zinn, 1990). Thus, the combination of attentional training through meditation and the cognitive reframing of daily experiences through positive reflection appears to create a synergistic effect that maximizes the benefits of both practices.

Negative Affect (NA): The observed reduction in NA for Groups 2 and 3 also aligns with literature demonstrating that breath meditation mitigates physiological stress responses and promotes emotional resilience. Studies show that breath meditation activates the parasympathetic nervous system, reducing stress markers like cortisol and enhancing vagal tone, which is associated with better emotional regulation and reduced anxiety (Brown & Gerbarg, 2005, Tang et al., 2009). In the current study, Group 2's combination of breath meditation and positive reflection may have further reinforced these stress-reducing effects by orienting participants away from negativity and toward positive interpretations of their day. Group 3, though not engaged in positive reflection, showed similar NA reductions, which aligns with findings that meditation alone can reduce emotional reactivity and increase psychological flexibility (Desbordes et al., 2012).

The significant differences between Group 2 and the control group (Group 4) underscore the additive effects of combining mindfulness-based practices with positive psychology exercises. While **Group 1** also practiced "Three Good Things" with body scanning, the lack of significant changes in PA and NA compared to breath meditation groups suggests that body scan alone may not effectively engage the cognitive and emotional regulatory processes that breath meditation does. The body scan practice, often used to promote physical relaxation, may have been beneficial in fostering awareness of bodily sensations but less impactful for emotional modulation (Kabat-Zinn, 1990). This finding supports recent literature indicating that the specific type of mindfulness practice may influence its effectiveness on particular emotional outcomes (Feldman et al., 2010).

Limitations

While the study provides valuable insights, several limitations suggest directions for future research:

- 1. Demographic Specificity and Age Generalizability:** Given that the sample was composed predominantly of young adults, it remains unclear whether the observed effects would generalize across different age groups. Previous studies suggest that older adults may respond differently to mindfulness-based interventions, as aging can influence both emotional regulation and

physiological responses to stress (Mather & Carstensen, 2005). Future research should examine the effects of breath meditation across a broader age range.

2. Duration of Intervention: While the 21-day period was sufficient to produce measurable changes, the longevity of these effects is unknown. Prior research on meditation suggests that extended practice periods lead to cumulative benefits, including sustained decreases in anxiety and increases in positive affect (Goyal et al., 2014). Longitudinal studies would help to determine whether the benefits of this short-term intervention persist and how they compare to long-term practice effects.

3. Objective Physiological Measures: This study relied on self-reported emotional outcomes, which are subject to reporting biases. Future studies could incorporate physiological indicators such as cortisol levels, heart rate variability, and EEG measurements to provide objective data on how breath meditation and positive reflection impact stress responses and emotional regulation (Tang et al., 2009; Desbordes et al., 2012).

4. Control for Expectancy and Placebo Effects: As participants in the experimental groups may have experienced expectancy effects from engaging in structured exercises, a future control group with non-meditative but structured activities (e.g., guided journaling) could help to disentangle the specific benefits of meditation from general engagement effects.

Practical implications

The results of this study suggest a variety of practical applications for breath meditation and positive reflection, which are cost-effective and easily implementable practices for emotional well-being:

1. Incorporation into Mental Health Programs: The study's results point to breath meditation as a viable, low-cost option for improving emotional regulation, particularly for individuals experiencing mild-to-moderate symptoms of anxiety or mood disturbances. Integrating this practice with positive reflection exercises could amplify its effects, making it suitable for use in outpatient mental health services or community wellness programs.

2. Educational and Workplace Settings: Given the significant improvements in young adult participants, brief daily breath meditation practices may help students and employees manage stress and maintain emotional balance. Studies show that implementing mindfulness programs in schools and workplaces leads to reduced stress and improved productivity, suggesting that these environments could benefit from structured breath meditation sessions (Roeser et al., 2013; Hülshager et al., 2013).

3. Scalable Self-Care Practices for Personal Growth: The “Three Good Things” exercise, which encourages gratitude by identifying daily positives, has shown lasting impacts on well-being even after short-term practice (Seligman et al., 2005; Emmons & McCullough, 2003). For individuals seeking personal growth, combining this exercise with breath meditation could strengthen self-regulation skills and foster resilience, providing a sustainable approach to emotional health.

Directions for future research

While the current study provides robust evidence for the benefits of breath meditation and positive reflection, several limitations highlight directions for future research:

1. Age and Demographic Diversity: The study primarily involved young adults, and future research should explore the effects of breath meditation across different age groups. Age can influence emotional regulation capacities and stress reactivity, suggesting that older adults or adolescents may respond differently to these practices (Mather & Carstensen, 2005). Cross-sectional studies comparing age groups could provide insights into age-specific adaptations of mindfulness practices.

2. Long-Term Effects: This study’s short 21-day intervention period yielded meaningful benefits, but the durability of these changes remains uncertain. Research suggests that sustained meditation practice leads to cumulative benefits, with extended practice often associated with more profound emotional regulation, reduced reactivity to stress, and increased positive affect (Goyal et al., 2014; Cresswell et al., 2016). Longitudinal studies that track participants over several months or years would help determine the long-term effects of breath meditation and whether its benefits plateau, grow, or diminish with extended practice.

3. Physiological and Neurobiological Measures: While the current study focused on self-reported emotional outcomes, incorporating objective physiological or neurobiological markers would provide a deeper understanding of the mechanisms underlying these psychological changes. Research suggests that mindfulness practices affect brain regions involved in emotional regulation, such as the prefrontal cortex and amygdala (Desbordes et al., 2012; Tang et al., 2015). Future studies using neuroimaging, cortisol sampling, or heart rate variability could offer insights into how breath meditation modulates these processes at the biological level.

4. Comparative Efficacy of Mindfulness Techniques: The limited impact of body scanning on emotional regulation in this study highlights the need for further research on the differential effects of mindfulness practices. For example, loving-kindness meditation has shown promise in fostering empathy and compassion, and may be particularly beneficial for social-emotional outcomes (Hofmann et al., 2010). Studies comparing various mindfulness approaches could help clarify which practices are most effective for specific mental health goals.

5. Placebo Effects and Expectancy Bias: Participants in experimental groups may have experienced improvements partly due to expectancy effects or the structured nature of the interventions. Future research could include a more active control group, perhaps involving a non-meditative activity with similar structure and engagement, to account for potential placebo effects. This would help isolate the unique benefits of breath meditation and positive reflection from general effects associated with structured self-reflection.

Conclusion

This study suggests that a 21-day breath meditation intervention may improve emotional well-being by increasing positive affect and reducing negative affect. The strongest effects were observed when breath meditation was combined with the “Three Good Things” exercise, indicating that mindfulness-based breath regulation and positive reflection may complement each other in supporting emotional balance.

The findings highlight the potential value of simple, accessible practices for stress regulation and mental health promotion. Breath meditation may act through both physiological and psychological pathways, including autonomic regulation, attentional stabilization, and improved emotional awareness. When paired with gratitude-based reflection, it may additionally support cognitive reframing and strengthen positive emotional experience.

Further research should examine the long-term effects of such interventions, include more diverse populations, and incorporate objective physiological measures. Nevertheless, the present findings support the use of breath meditation and positive reflection as promising tools for preventive mental health programs, educational settings, workplace well-being, and everyday self-care.

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