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Abstract

Mindfulness—attentive, non-judgmental focus on present experiences—is widely acknowledged for its positive impact on well-being, yet research into the mechanisms underlying its benefits has been inconclusive. According to one influential theory, the Mindfulness-to-Meaning Theory, mindfulness enhances well-being by increasing awareness of mental states, thereby facilitating top-down emotion regulation skills, such as cognitive reappraisal. Conversely, the Monitor-and-Acceptance Theory posits that mindfulness benefits well-being by enhancing bottom-up acceptance of experiences, reducing the need for top-down emotion regulation. In a controlled laboratory experiment, we assessed participants' immediate affective responses (valence and arousal) to emotional stimuli, depending on their level of mindfulness proficiency. We found that enhanced monitoring skills were associated with increased arousal and more negative valence, whereas enhanced acceptance skills—particularly among experienced practitioners—were linked to reduced arousal and more positive valence. However, mindfulness skills did not moderate the outcomes of top-down emotion regulation. These results support the Monitor-and-Acceptance Theory, indicating that mindfulness enhances well-being primarily through acceptance rather than improving top-down emotion regulation skills. Nonetheless, the limitations of our study—such as sample size, reliance on self-report measures, and participant homogeneity—underscore the preliminary nature of our results and do not allow for the definitive exclusion of the Mindfulness-to-Meaning Theory. It remains possible that these two theories, as suggested by the Dynamic Model of Mindfulness, account for distinct mechanisms underlying the dynamic effects of mindfulness on well-being. Therefore, while this study highlights the importance of acceptance skills in promoting affective well-being, further research is called for.

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Introduction

In recent years, mindfulness has garnered significant attention in psychological research for its potential to enhance mental health and well-being (Goleman & Davidson, 2018). Numerous studies have reported beneficial effects of mindfulness practices, including reductions in stress, anxiety, and depressive symptoms (Goleman & Davidson, 2018). However, alongside these benefits, there is evidence suggesting that mindfulness may also have adverse effects on mental health for certain individuals, highlighting the complexity of its impact (Lindahl et al., 2017).

Despite the growing body of research on mindfulness, the underlying mechanisms through which it influences mental health outcomes remain unclear (Wenzel et al., 2020). Different theoretical frameworks have been proposed to elucidate these mechanisms, including the Mindfulness-to-Meaning Theory, the Monitor-and-Acceptance Theory, and the Dynamic Model of Mindfulness (Garland et al., 2017; Lindsay & Creswell, 2017; Lu et al., 2023). However, these theories, though partially contradictory, have not been extensively compared, leaving uncertainty about which best describes mindfulness.

Two aspects are central to understanding the effects of mindfulness on well-being. The first pertains to differences in effects of mindfulness skills. Mindfulness is conceptualized as a multifaceted construct, composed of skills that fall into either the category of monitoring skills or accepting skills. While monitoring facets involve directing and sustaining attention, acceptance facets entail accepting thoughts and emotions without judgment or reaction (Bishop et al., 2004; Simione et al., 2021). Current mindfulness theories contradict each other on how these two facets differently influence well-being outcomes. It is unclear whether merely monitoring experiences is sufficient to improve their pleasantness or if it merely intensifies the quality of experiences, possibly negative, with acceptance being responsible for shifting the felt quality towards a more positive state (Wenzel et al., 2020).

The second aspect central to understanding the effects of mindfulness on well-being is its interaction with top-down emotion regulation strategies. Top-down emotion regulation strategies involve conscious, deliberate efforts through which individuals manage their emotional experiences, influencing psychological well-being and adaptive functioning across various domains of life (Gross, 2013). Effective emotion regulation strategies enable individuals to navigate challenges, cope with stress, and maintain mental health. Conversely, deficits in emotion regulation are implicated in a range of psychological disorders, underscoring the critical importance of understanding these mechanisms (Gross, 2013). The debate persists as to whether mindfulness enhances the effectiveness of these top-down strategies by promoting cognitive control or alternatively diminishes their necessity by cultivating a non-reactive acceptance of internal experiences (Wenzel et al., 2020).

Research Objectives and Structure

This study seeks to address these questions and test competing theoretical models to clarify the underlying processes by which mindfulness influences well-being. This will be done in two steps: first, by examining the direct impact of different mindfulness facets on affective experiences such as emotional valence and arousal; and second, by assessing if mindfulness moderates the effectiveness of top-down emotion regulation strategies. The aim is to clarify which of the competing theories best describes the influence of mindfulness on well-being, with the potential for an integrative model to emerge as the answer.

Interdisciplinary Aspect

This exploration is undertaken through an interdisciplinary lens. While our work is primarily situated within psychology, we integrate insights from philosophy and contemplative traditions. Our approach underscores the importance of psychological perspectives in understanding mindfulness and bridges psychological theory with philosophical discourse and practical contemplative practices, offering a comprehensive exploration of mindfulness within the broader context of cognitive science.

Structure

The thesis begins with a comprehensive literature review that critically synthesizes existing research on mindfulness theories, emotion regulation, and empirical findings related to their intersection. This review sets the stage by highlighting the gaps in current knowledge and laying the groundwork for the hypotheses.

The methodology section outlines the research design, participant recruitment procedures, experimental protocols, and data analysis methods employed in this study. Special attention is given to the measurement of mindfulness constructs and momentary affective well-being as well as the establishment of different emotion regulation conditions.

Following the methodology, the results chapter presents empirical findings regarding the direct effects of mindfulness on momentary affective experiences and its moderation of emotion regulation strategies. These findings are interpreted within the context of the theoretical frameworks tested, providing insights into the mechanisms underlying mindfulness.

Lastly, the discussion section synthesizes the results with existing literature, offering theoretical implications, practical applications, and directions for future research.

Literature Review

Mindfulness

Mindfulness, rooted in Buddhist traditions, has gained significant attention in contemporary psychology and neuroscience. Mindfulness is commonly defined as the intentional, non-judgmental awareness of present-moment experiences, including thoughts, feelings, bodily sensations, and the surrounding environment (Kabat-Zinn, 1990). It can be contrasted with states of mind in which attention is focused elsewhere, including preoccupation with memories, fantasies, plans, or worries, and behaving automatically without awareness of one's actions. Kabat-Zinn (2003) notes that whereas most people probably are capable of mindfulness, individuals may vary over time and are likely to differ from one another in their tendency to be mindful. Mindfulness is both a dispositional trait, reflecting a natural tendency to be mindful, and a skill that can be enhanced through practice (Kabat-Zinn, 2003).

People have been practicing mindfulness for thousands of years, whether on its own or as part of a larger tradition (Kabat-Zinn, 2003). Meditation as a practice for the cultivation of mindfulness has a long history in Eastern spiritual traditions, primarily Buddhism (Kabat-Zinn, 1990). These traditions suggest that regular practice of mindfulness meditation reduces suffering and develops positive qualities, such as awareness, insight, wisdom, compassion, and equanimity. From a Buddhist perspective mindfulness is practiced, seeking liberation from human suffering, as human suffering is inevitably based on desires for things to be different than they are, creating an inner conflict between the present state and an ideal state (Nyklíček, 2011).

In recent decades, health professionals and researchers have suggested that the cultivation of mindfulness may also be beneficial to Westerners not interested in adopting Eastern terminology or traditions. Thus, mindfulness practices are sometimes conceptualized as sets of skills that can be taught independently of their spiritual origins (Kabat-Zinn, 1990).

Contemplative practices such as yoga, prayer, journaling, and Tai Chi have been scientifically shown to improve mindfulness skills (Hanley et al., 2015; Knabb, 2012).

Research on mindfulness has burgeoned in recent decades, with studies examining its effects on various aspects of human functioning, including mental and physiological health and cognitive performance. Neuroimaging studies have elucidated the neural correlates of mindfulness, highlighting changes in brain regions associated with attention regulation, emotion processing, and self-awareness (Tang, 2017). The relationship between mindfulness and affective well-being in particular has received increasing attention in recent years, promising valuable insights for therapeutic interventions.

Affective Well-being

Affective well-being concerns the frequency and intensity of positive and negative affect experienced by individuals (Diener, 1984). It is a primary component of subjective well-being, along with cognitive well-being, which pertains to how individuals evaluate their lives in terms of life satisfaction (Diener, 1984).

Affect, as subjectively experienced in emotions, moods, and other feelings, is a central aspect of the mind. Wilhelm Wundt posited as early as 1897 that individuals are likely "never in a state entirely free from feeling" (Wundt, 1897/1998, p.92) suggesting that affect permeates all mental states, including thoughts and perceptions. Affect encompasses a broad spectrum of experiences, from fleeting emotions like joy or sadness to enduring mood states like contentment or anxiety. It is not only responsive to external stimuli but also influenced by internal processes and individual differences. In essence, affect serves as a lens through which individuals interpret and navigate their internal and external worlds, shaping their perceptions, decisions, and overall well-being (Wundt, 1897/1998).

Subsequent research has underscored the significance of affect to various psychological phenomena, ranging from well-being and basic processes like memory and perception to higher-order processes such as moral judgments and attitudes (Kuppens et al.,

2013). Given the centrality of affect to the mind, inquiries into its nature and structure hold relevance across a broad spectrum of research topics, constituting a fundamental aspect of psychological inquiry (Kuppens et al., 2013).

Affective well-being is typically assessed by asking individuals to rate the extent of their experience of different affective states over a specified timeframe or at the present moment (Kuppens et al., 2013).

Arousal and Valence

Wundt (1897/1998) was among the first psychologists to propose that affective experiences entail at least two properties: valence (ranging from unpleasant to pleasant) and arousal (ranging from feeling quiet to active). Since then, various proposals have emerged regarding the fundamental dimensions of affect. Despite differences in the number and labelling of dimensions, these proposals converge on identifying valence and arousal (or some combination thereof) as foundational to the nature of affect (Kuppens et al., 2013).

In this study we explore the relationship between mindfulness and affective well-being by specifically focussing on affective responsivity, conceptualized as the change in momentary affect in response to an external event (Rueschkamp et al., 2020). In laboratory experiments such as ours, momentary affect is often measured through arousal and valence ratings of affective pictures. It is a component of affective well-being. While momentary affect captures immediate emotional responses, affective well-being is more stable and reflects long-term emotional patterns. Frequent experiences of positive momentary affect (positive valence and appropriate arousal) tend to enhance overall positive affect and life satisfaction (Parkinson et al., 1995). Conversely, frequent negative momentary affect can detract from affective well-being. We use the term 'momentary affective well-being' to capture the dynamic nature of momentary affect and its impact on an individual's overall sense of well-being.

Mindfulness and Affective Well-being

Mindfulness has garnered significant attention in contemporary psychology research for its potential influence on affective well-being. A wealth of empirical evidence supports the notion that mindfulness enhances happiness and positive emotional experiences, fosters the development of positive psychological resources, promotes self-regulatory behaviors, and reduces stress (Mandal et al., 2017). Across diverse populations, ranging from distressed students to cancer patients, mindfulness has been shown to alleviate symptoms of general distress, anxiety, and depression while enhancing positive mood and subjective quality of life (Nykliček, 2011). In general mindfulness is associated with greater emotional intelligence and positive affect (Schutte & Malouff, 2011).

To better understand the specific mechanisms through which mindfulness influences affective well-being, several studies have focused on the relationship between mindfulness and immediate momentary affect in response to stimuli. These studies examine the valence (pleasantness) and arousal (intensity) of pain perception between mindfulness practitioners and control groups. Researchers observed that the mindfulness group reported significant improvements in valence (pain unpleasantness), while no differences between the two groups were observed in the arousal perception of pain (Lu et al., 2023; Zorn et al., 2020; Perlman et al., 2010). Timmermann et al. (2023) argue that mindfulness specifically improves pain valence but not arousal by observing and counteracting pain catastrophizing through a present-centered metacognitive stance. By maintaining openness to sensory experience rather than becoming immersed in pain, mindfulness practitioners—individuals who regularly engage in mindfulness exercises to cultivate awareness and acceptance of the present moment—become aware of their affective and motor reactivity to pain as a cognitive process, leading to a decoupling of pain intensity from unpleasantness and ultimately regulating the latter (Timmermann et al., 2023).

Adverse Effects of Mindfulness

Despite the largely positive associations between mindfulness and well-being, there is a growing recognition of potential adverse effects, sometimes termed “meditation sickness.” Counterbalancing the mindfulness hype of the last decade, Lindahl et al. (2017) argue that the adverse effects of mindfulness practice have been largely overlooked, as three-quarters of previous studies have not measured meditation side effects.

Binda et al. (2022) suggest that mindfulness may initially increase negative affect in individuals, particularly those with certain psychological vulnerabilities or trauma histories. These effects may include heightened awareness of negative emotions or discomfort when confronting difficult thoughts and feelings during mindfulness practice, often portrayed by instructors as an inevitable initial consequence of increased self-awareness. Lindahl et al. (2017) note that mindfulness practices can increase both positive and negative affectivity.

More severe potential adverse effects reported in clinical and medical literature include increased anxiety, depression, dissociation, and even symptoms resembling psychosis, seizures, depersonalization, mania, and other forms of clinical deterioration (Lindahl et al., 2017). We are only beginning to understand when and how mindfulness causes these adverse effects. Variability in mindfulness proficiency (differences in the competence to embody mindfulness) might play a role (Binda et al., 2022).

Multifaceted Nature of Mindfulness

In the field of mindfulness research, there is a widely accepted consensus that mindfulness is a multifaceted construct (Baer et al., 2006). However, the number and specific nature of these facets can vary depending on the theoretical perspective or model employed by researchers. Typically, mindfulness is understood to encompass four or five primary facets, often referred to as skills. These including observing, describing, acting with awareness, acceptance of inner experience, and sometimes non-reactivity to inner experience as a fifth factor. These facets collectively illustrate the multidimensional nature of mindfulness.

They can be clustered into two groups of monitoring and acceptance facets (Bishop et al., 2004; Simione et al., 2021). The monitoring facet involves maintaining a moment-to-moment awareness of one's experiences, achieved through directing and sustaining attention. This includes the skills of observing internal and external stimuli, describing these experiences, and acting with awareness. The acceptance facet, on the other hand, entails adopting an attitude of openness and non-judgmental acceptance towards these experiences, without attempting to alter them. Essentially, it involves letting go of resistance (Kabat-Zinn, 1990).

Two Principal Mindfulness Theories

Two principal theories have emerged to explain how differences in mindfulness skills can affect well-being: a bottom-up process, characterized by reduced reactivity to emotion-eliciting stimuli, and a top-down process, influencing emotions through regulatory efforts (Wenzel et al., 2020). These theories, namely the Mindfulness-to-Meaning Theory and the Monitor-and-Acceptance Theory (Wenzel et al., 2020), operate at distinct stages within James Gross's Process Model of Emotion Regulation (Gross, 2013).

The Process Model of Emotion Regulation. Emotion regulation strategies play a crucial role in how individuals experience and express emotions, significantly influencing their psychological well-being (Gross, 2013). Emotions are complex psychological and physiological responses to stimuli that involve subjective experiences, physiological arousal, and behavioral expressions (Gross, 2013). Gross's Process Model of Emotion Regulation categorizes strategies based on their timing within the emotion generation process, offering insights into how individuals can effectively manage their emotional experiences (Gross, 2013).

According to Gross, emotion regulation can occur through different mechanisms at various stages of emotional processing. Antecedent-focused strategies operate early in the emotion generation process, before an emotional response fully manifests. These strategies

include attentional focusing (such as concentrating on specific aspects of a situation) and cognitive change (such as reappraising the meaning of a situation or distancing oneself from the emotional trigger). In contrast, response-focused strategies occur after an emotional response has fully emerged, primarily involving the suppression of emotions or emotional expression (Gross, 2013).

Antecedent-focused strategies are generally considered more adaptive because they can alter the subjective experience of an emotion before it fully manifests (Kaunhoven & Dorjee, 2021). Response-focused strategies tend to be less effective in modifying emotional experiences and can lead to prolonged emotional distress (Gross, 2013).

The term "top-down emotion regulation strategies" encompasses both cognitive and response strategies, distinguishing them from attentional strategies. Top-down strategies involve conscious, deliberate efforts to influence emotions, such as reappraisal and suppression. In contrast, attentional strategies, often referred to as "bottom-up" strategies, involve shifting focus and attention to regulate emotions, such as mindfulness practices.

Mindfulness-to-Meaning Theory. Garland et al. (2015) introduced the Mindfulness-to-Meaning Theory, situating mindfulness within the cognitive change stage of the Process Model of Emotion Regulation. This theory seeks to elucidate the relationship between mindfulness and eudaimonic well-being, which encompasses a sense of meaning, purpose, and vitality. Eudaimonic well-being differs from hedonic well-being, which focuses on pleasure without necessarily involving a deeper sense of meaning (Sgherza et al., 2022). In this context, "meaning" denotes the coherence, significance, and sense-making of one's life experiences within a broader context or narrative. "Purpose" refers to the direction and intentionality in one's life, driven by goals and aspirations that provide motivation and fulfillment.

According to this theory, practicing mindfulness during stressful situations induces several cognitive and emotional shifts. Initially, individuals learn to shift their attention,

allowing them to distance themselves from stressful thoughts and view them from a broader perspective. This heightened awareness of thoughts, emotions, and surroundings helps individuals reconsider and adapt their self-perception and worldview, ultimately fostering a more positive outlook and a deeper sense of purpose (Garland et al., 2017).

The Mindfulness-to-Meaning Theory posits that mindfulness enhances the variety and effectiveness of emotion regulation strategies, particularly reappraisal. Reappraisal involves reinterpreting a situation to alter its emotional impact. By becoming aware of and accepting their sensations, individuals can interrupt habitual and automatic reactions to present-moment experiences, recognizing both positive and negative aspects of situations. This expanded attentional scope facilitates more effective emotion regulation, such as reappraising situations to highlight their positive facets. Repeated mindfulness practice is therefore expected to enhance overall well-being over time (Garland et al., 2015).

Given its emphasis on enhancing reappraisal and promoting adaptive emotional responses, this perspective primarily aligns mindfulness with the cognitive change strategies outlined in Gross's model (Wenzel et al., 2020).

Evidence supporting the Mindfulness-to-Meaning Theory includes studies showing that mindfulness not only correlates with brain regions involved in emotional arousal but also with those related to cognitive control. This suggests that mindfulness enhances emotion regulation through increased activation of executive control processes (Wenzel et al., 2020). Additionally, research demonstrates overlap in the brain regions activated during cognitive reappraisal and mindfulness, with both engaging top-down regulatory mechanisms to modulate emotional responses. This is reflected in increased medial prefrontal cortex activity and decreased amygdala activity (Kaunhoven & Dorjeen, 2021).

Monitor-and-Acceptance Theory. Conversely, the Monitor-and-Acceptance Theory attributes the association between mindfulness and well-being to reduced reliance on emotion regulation (Lindsay & Creswell, 2017). This bottom-up theory suggests that mindfulness

diminishes the need for emotion regulation by fostering monitoring and acceptance of both negative and positive emotions.

However, Lindsay & Creswell argue, mere monitoring is insufficient for enhanced well-being, as it may amplify negative experiences. Thus, individuals must adopt an accepting attitude toward sensations to mitigate affective reactivity and the necessity for emotion regulation. This underscores the importance of acceptance, defined as willingness to remain present with experiences without attempting to alter or judge them as favorable or unfavorable (Lindsay & Creswell, 2017).

According to the Monitor-and-Acceptance Theory proposed by Lindsay and Creswell (2017), mindfulness aligns with attentional deployment strategies, which constitute the earliest stage in Gross's Process Model of Emotion Regulation. This contrasts with the cognitive regulation focus suggested by the Mindfulness-to-Meaning Theory.

Support for the bottom-up perspective arises from studies indicating reduced activation in brain regions involved in emotional processing among experienced mindfulness meditators, suggesting a functional decoupling of cognitive-evaluative and sensory-discriminative dimensions of bodily sensations. This decoupling implies that mindfulness practitioners may experience emotions with less cognitive elaboration and reactivity, leading to a reduced need for effortful emotion regulation (Wenzel et al., 2020).

Moreover, mindfulness practices have been found to alter brain activation patterns, thereby reducing the demand for regulatory resources in emotion regulation tasks (Lutz et al., 2014). Specifically, the non-judgmental acceptance facet of mindfulness is associated with decreased use of traditional emotion regulation strategies, such as suppression or reappraisal (Wenzel et al., 2020). This suggests that mindfulness fosters a more adaptive response to emotions by promoting acceptance and non-reactivity to internal experiences.

Comparison of Mindfulness Theories. The two theories have been relatively underexplored in tandem (Wenzel et al., 2020). Therefore, this study endeavors to test the two perspectives on the relationship between mindfulness, emotion regulation and well-being.

If mindfulness is best characterized as a top-down process that can be situated during the cognitive change stage in the process model of emotion regulation according to the Mindfulness-to-Meaning Theory, it should moderate the effectiveness of top-down emotion regulation strategies such as reappraisal, distancing, and suppression in regulating affective well-being through enhancing awareness, acceptance and cognitive flexibility. This allows individuals to apply top-down strategies, more effectively, leading to better emotional regulation and improved emotional outcomes (Wenzel et al., 2020; Garland et al., 2015).

Further, considering the differential impacts of various mindfulness skills on well-being, the Mindfulness-to-Meaning Theory suggests that both monitoring and acceptance skills in mindfulness play integral roles in enhancing affective well-being. Increases in monitoring skills in mindfulness may therefore independently enhance affective well-being, even without corresponding changes in acceptance skills. This perspective contrasts with the Monitor-and-Acceptance Theory, which emphasizes the critical role of acceptance in promoting well-being and argues that mere monitoring, without concurrent acceptance, may inadvertently reduce well-being by heightening awareness of unpleasant sensations.

According to the Mindfulness-to-Meaning Theory, strong monitoring skills enable individuals to notice and appreciate meaningful moments in their lives, while acceptance skills facilitate non-judgmental responses to these experiences. This dual capacity supports individuals in finding deeper meaning and purpose, ultimately contributing to enhanced overall well-being (Wenzel et al., 2020).

If, however, as proposed by the Monitor-and-Acceptance Theory, mindfulness is better characterized as a bottom-up process that reduces the need for emotion regulation by monitoring and accepting one's own emotions and behaviors and can be best situated during

the attentional deployment stage in the process model of emotion regulation, mindfulness facets should not be associated with the impact of top-down emotion regulation strategies on affective well-being (Wenzel et al., 2020). According to this approach emotions get naturally regulated through observation and acceptance early in the Process Model of Emotion Regulation before the cognitive stage of actively altering of thoughts or emotions. Therefore, mindfulness proficiency is expected not to impact the effectiveness of top-down emotion regulation strategies that rely on changing or reinterpreting thoughts and emotions (Wenzel et al., 2020). Additionally, according to the Monitor-and-Acceptance Theory, we would expect monitoring skills to intensify the experience of any given quality through increased awareness, while acceptance would enhance the pleasantness of the experience through reduced resistance (Wenzel et al., 2020).

Moreover, there exists a scenario where both the Mindfulness-to-Meaning and Monitor-and-Acceptance theories find support, necessitating an integrative model. Considering that these theories operate at different stages in the process model of emotion regulation, it becomes apparent that they are not mutually exclusive. Engaging in mindfulness practices may enhance both non-reactivity and deliberate emotion regulation (Wenzel et al., 2020).

The Dynamic Model of Mindfulness, proposed by Lu et al. in 2023, exemplifies such an integrative approach. This model posits that the impact of mindfulness on affective well-being varies according to mindfulness proficiency, defined as the skill in maintaining present-moment awareness with non-judgmental acceptance. Initially, mindfulness mitigates pain perception through enhanced cognitive regulation. As mindfulness skills further develop, the model suggests a transition where the impact of mindfulness shifts from predominantly relying on cognitive control to dissociating sensory processing from cognitive-affective processing. At this stage, pain processing hinges solely on the sensory experience of the current stimulus, with minimal cognitive-affective interference (Lu et al., 2023).

In this process individuals become more adept at observing sensory experiences (such as pain sensations) without immediately engaging in cognitive elaboration or emotional reaction (Lu et al., 2023). This shift allows the experience of sensations, such as pain, with greater acceptance and non-reactivity, fostering a sense of calm and equanimity in the face of challenging stimuli. This ability to transcend sensory experiences contributes to an overall sense of well-being, characterized by greater peace of mind, emotional stability, and adaptive responses to life's ups and downs (Kabat-Zinn, 1990).

This study aims to investigate the underlying mechanisms of mindfulness by examining two main aspects. Firstly, it explores how the skills of monitoring and acceptance in mindfulness differentially influence momentary affect. Secondly, it examines the role of mindfulness in moderating the efficacy of top-down emotion regulation.

Hypothesis 1

Our first hypothesis aims to explore how monitoring and acceptance skills differently influence momentary affect. In this experiment, valence and arousal responses to stimuli are used as indicators. We assume that enhancements in momentary affective well-being are indicated by increases in positive valence responses. Additionally, since our experiment primarily focuses on negative stimuli and does not include positive stimuli, we consider an increase in momentary arousal (indicating greater perceived intensity of stimuli) as an indicator of reduced momentary affective well-being.

Previous research that examined how different mindfulness skills variably impact momentary affective well-being has not supported the Mindfulness-to-Meaning Theory. Instead, evidence has favored the interaction effect proposed by Lindsay and Creswell (2017) in their Monitoring-and-Acceptance Theory. They suggested that high monitoring coupled with low acceptance leads to heightened affective reactivity and subsequent psychological disturbances, while high monitoring paired with high acceptance results in reduced reactivity and better mental health.

This aligns with Lindsay and Creswell's (2017) findings that monitoring increases psychological symptoms. Additionally, Pearson et al. (2015) demonstrated that individuals with high monitoring and low acceptance levels exhibited worse psychological outcomes. Simone et al. (2021) showed that while monitoring predicted ill-being variables, the positive effects of mindfulness on psychological outcomes largely depended on acceptance. Furthermore, Simone et al. (2021) did not find interaction effects between monitoring and acceptance skills, suggesting that acceptance alone, rather than its interaction with monitoring, enhances affective well-being.

Therefore, expecting a sample of non and novice mindfulness practitioners, we propose the following first hypothesis:

H1: For novices and non-practitioners, enhanced acceptance skills improve momentary affective well-being, whereas heightened monitoring skills tend to decrease momentary affective well-being.

Mindfulness and Emotion Regulation

Beyond the direct impact of mindfulness on momentary affect, current research is just scratching the surface of the role that emotion regulation plays in this dynamic. While studies indicate a connection between mindfulness and top-down emotion regulation, the precise nature of this relationship and the underlying mechanisms remain incompletely understood (Iani et al., 2019). The key question persists whether mindfulness moderates emotion regulation efficacy and the specific mechanisms that link these constructs.

The Mindfulness-to-Meaning Theory suggests that mindfulness enhances the cognitive aspects of emotion regulation, thereby improving its efficacy (Garland et al., 2017). In contrast, the Monitor-and-Acceptance Theory proposes that mindfulness acts at an earlier stage in the emotion regulation process by promoting acceptance of experiences, thereby reducing the need for subsequent regulation efforts (Lindsay & Creswell, 2017). Additionally, the Dynamic Model of Mindfulness posits that the effects of mindfulness evolve dynamically

over time. Initially, mindfulness supports well-being through improved cognitive regulation. With continued practice, mindfulness enhances the separation of sensory processing from cognitive-affective processing, reducing the necessity for active emotion regulation efforts (Lu et al., 2023).

This study seeks to test for this, by exploring how mindfulness influences the effectiveness of three distinct emotion regulation strategies—reappraisal, distancing, and suppression of expression—compared to a control condition (viewing). Given their varied mechanisms and effects on emotional experiences, these strategies provide a robust framework for investigating the nuanced ways by which mindfulness impacts emotion regulation.

Reappraisal

Reappraisal is one of the two main cognitive tactics for emotion regulation, the other being distancing. It is the most widely researched antecedent focused strategy. It involves deriving an alternative outcome or meaning for a stimulus to alter its emotional effect. For example, feeling hurt by criticism from a coworker might be minimized by imagining that the coworker is trying to help rather than criticize (Powers & LaBar, 2020).

Reappraisal effectively reduces negative emotions by altering the meaning assigned to a stimulus, turning a negative emotional situation into a positive one. It tends to produce large effect sizes in emotion regulation research and is versatile, making it an appealing strategy in many situations (Powers & LaBar, 2020).

Reappraisal and Mindfulness. Garland et al. (2015) propose that mindfulness serves as a catalyst for reappraisal by fostering a de-centered meta-cognitive awareness, which facilitates disengagement from automatic emotional appraisals (Garland et al., 2011). Their studies support this notion, revealing that mindfulness not only promotes the use of reappraisal but also enhances its efficiency (Garland et al., 2011).

However, the relationship between mindfulness and reappraisal is nuanced. Lindsay and Creswell (2017) found no evidence supporting the assumption that mindfulness moderates the effectiveness of reappraisal. It remains uncertain whether mindfulness actively enhances the efficacy of reappraisal (Iani et al., 2019).

Following the logic of the Dynamic Model of Mindfulness, assuming that in the earlier stages of mindfulness proficiency beneficial aspects are reached through enhanced cognitive control, while at later stages through non-reactivity, a moderation effect might initially exist and decrease with mindfulness proficiency (Lu et al., 2023).

Distancing

Distancing, along with reappraisal, is a primary cognitive strategy for emotion regulation. It involves adopting a new perspective to alter the psychological distance and emotional impact of a stimulus. For example, feeling hurt by criticism from a coworker might be minimized by imagining how a neutral, objective observer would perceive the situation. While reappraisal focuses on transforming the content or meaning of the stimulus, distancing focuses on changing the viewpoint from which the stimulus is considered. Therefore, reappraisal is stimulus-dependent, while distancing is not (Powers & LaBar, 2020).

The adaptive role of distancing in managing distressing emotions has been emphasized for decades in cognitive therapies. It helps protect individuals from cycles of recurrent negative thinking and worry by encouraging them to view their thoughts as psychological events rather than facts (Petrova et al., 2021).

Although reappraisal has received greater attention in emotion regulation research, the benefits of distancing warrant further investigation (Powers & LaBar, 2020). Denny and Ochsner (2014) found that longitudinal training in distancing was associated with decreased stress in daily life and more neutral evaluations of aversive content, even when no regulation was instructed. These benefits were not observed with longitudinal training in reappraisal,

potentially because applying distancing across diverse situations may require less effort than reappraisal, as distancing solutions are not bound by the specific features of a stimulus.

Distancing and Mindfulness. Distancing is akin to mindfulness in that it alters the psychological distance and emotional impact of a stimulus without attempting to change its content, similar to mindfulness practices (Powers & LaBar, 2020). However, unlike mindfulness, distancing involves stepping back to objectively observe emotions without necessarily accepting them (Nykliček, 2011). Therefore, distancing does not inherently build on the mindfulness skill of acceptance.

Distancing has received less attention in the scientific literature, and its specific relationship with mindfulness has not been directly studied. However, in a general exploration of the effects of mindfulness meditation training on emotion regulation, Garland et al. (2011) revealed a correlation between mindfulness training and heightened activation in brain regions crucial for self-awareness and cognitive control. These regions play a pivotal role in effectively implementing distancing strategies. This heightened activation suggests that mindfulness may enhance the cognitive processes underlying distancing.

In light of the Dynamic Model of Mindfulness, these findings could indicate that mindfulness might moderate the effectiveness of distancing for during earlier stages of mindfulness proficiency, as its effects largely rely on cognitive control. For advanced mindfulness skills, this effect might diminish due to the reduced coupling of sensory and cognitive-affective processing, allowing them to experience sensory inputs with less affective reactivity and less need to seek distance from them.

Expressive Suppression

Expressive suppression is a response modulation strategy that involves inhibiting ongoing emotion-expressive behavior. For example, maintaining a poker face during a card game. As a response-focused strategy it occurs relatively late in the emotion-generative process and primarily modifies the behavioral aspect of the emotional response. Expressive

suppression has been found to be less effective than cognitive strategies. Studies indicate that expressive suppression can increase negative emotions, potentially due to the discrepancy between the experienced emotion and the behavioral response, making individuals feel they are acting disingenuously (Kaunhoven & Dorjeen, 2021). Furthermore, suppression does not reduce the experience of negative emotion, which may continue to linger and accumulate unresolved. Therefore, it is considered a maladaptive strategy (Kaunhoven & Dorjeen, 2021).

Expressive Suppression and Mindfulness. Theoretically, mindfulness opposes the suppression of emotional expression by emphasizing the naturally calming effect of acceptance on emotional experiences, often reducing the need to express emotions outwardly (Nykliček, 2011; Kabat-Zinn, 1990). Research supports this notion, showing that greater acceptance tends to correlate with lower levels of emotional expression suppression, suggesting these two characteristics exist at opposite ends of a continuum (Iani et al., 2019).

However, if the maladaptive strategy of expressive suppression is used in the early stages of mindfulness practice, characterized by the Dynamic Model of Mindfulness as enhancing cognitive control, this increase in cognitive control might amplify the negative effects of expressive suppression on affective well-being. With continued practice, the ability to dissociate sensory perception from cognitive-affective processing may grow, reducing the need for emotion regulation and thereby diminishing the adverse impact of expressive suppression (Lu et al., 2023; Kabat-Zinn, 1990).

Hypothesis 2

Expecting a sample of non- and novice mindfulness practitioners, we propose the following second hypothesis:

H2: For non- and novice practitioners, the effect of emotion regulation on momentary affect is moderated by mindfulness. The moderation effect is expected to be positive for the adaptive strategies of reappraisal and distancing, and negative for the maladaptive strategy of expression suppression.

Methodology

Participants

Participants in our study were first- and second-year psychology students participating as part of their coursework in Motivation and Emotion and Cognitive Psychology (Repovš & Kocjan, 2022). A total of 63 students (mean age = 19.29, SD = 0.92; 85.71% female) attending the University of Ljubljana were included in this study. They received 1.5 experimental credits in Cognitive Psychology in exchange for their consent to use the data for research purposes.

Out of our 63 participants, 46 reported previous experience with mindfulness practices (including practices such as yoga, journaling and music). On average, these practitioners had accumulated 2094 hours of practice. Among them, 6 reported engaging in formal meditation practices, averaging 136 hours of meditation experience. According to Zorn et al. (2020), all of our participants were considered novice or non-practitioners, as none reported more than 10,000 hours of meditation practice.

Procedure

Our study builds on the Emotion Regulation 23 (EmReg 23) research conducted by the Mind & Brain Lab in Ljubljana, which examined the effects of various emotion regulation strategies on momentary affective well-being. Of the 96 EmReg 23 participants, those 63 who subsequently completed mindfulness questionnaires were included in the present study.

EmReg 23 Study

The EmReg 23 study aimed to investigate how different emotion regulation strategies vary in their effectiveness and the temporal properties of each strategy's performance. Participants were exposed to three distinct emotion regulation strategies in response to neutral and negative emotional stimuli: reappraisal, distancing, and expressive suppression. Additionally, a viewing condition was included as a control condition in which participants were instructed to experience the stimuli freely without specific instruction.

The stimuli for the study were pictures displayed on a screen in front of the participants. The pictures varied in their valence, with both neutral and negative emotional stimuli included. Emotion regulation performance was monitored using subjective reporting of momentary affect, including arousal and valence, and a set of objective physiological measures, such as activity of the corrugator supercilii eye muscle, heart rate frequency and variability, changes in skin conductance, changes in depth, force and frequency of respiration, pupil size, and brain activity captured by EEG.

Protocol of the EmReg 23 Experiment

The invitation to participate and the available dates were published on the courses' website. The invitation explained the purpose and conduct of the study, warned about the use of negative emotional stimuli, the exclusion criteria (non-corrected vision, diagnosis of neurological or psychiatric disorders and recent use of psychoactive drugs) and the instructions that participants must follow before taking part (no alcohol or other psychoactive substances 24 hours before the study, sufficient sleep, washed hair, etc.).

As participants entered the laboratory, we described the EEG, ECG, and EMG methods and the other physiological measurements that we carried out. Students were provided with a link to an inclusion questionnaire to be completed before registering for the appointment, which was used to assess their suitability for participation. In the questionnaire, they provided their demographic data (gender, age, handedness), information about their vision, possible psychiatric and neurological disorders, and use of psychoactive drugs. Participants were informed about the challenges of the study and asked about any concerns. They were given the opportunity to decline participation or withdraw from the study at any time. Only data from students who had read and signed the informed consent were used for research purposes. We made it clear to students that participation in the research was voluntary and was not a requirement for passing the course.

Participants performed the task in three conditions. Each condition was a subset of two of the three main emotion regulation strategies (reappraisal, distancing, expressive suppression) and the viewing control strategy. The experiment started with us explaining the different emotion regulation strategies and a test phase for participants to get familiar with the task and the strategies. We continued the experiment once we were sure that the participant understood the instructions and implemented the strategies correctly.

The experiment was organized into 9 blocks, each containing 30 trials. Each block included a fixed set of 30 stimuli or pictures, with an equal number of neutral and negative stimuli, randomly ordered within blocks across participants. For each block, participants were given one strategy to use for all 30 trials. Each strategy, represented by one block, was repeated three times throughout the experiment. The sequence of the blocks was varied between participants and balanced according to the Latin square method.

At the beginning of each block, an on-screen instruction was displayed, instructing the participant to either (a) freely observe the image or (b) use a specified emotion regulation strategy. Each trial started with a pictorial stimulus that was displayed on the screen for five seconds. The pictures were selected from three affective picture databases: the Geneva Affective Picture Database (GAPED), the International Affective Picture System (IAPS), and the Nencki Affective Picture System (NAPS). The pictures varied according to their valence (negative and neutral). For instance, a neutral picture might depict a vegetable, whereas a negative picture might depict a burned victim. After the image was shown, two image scales (Self-assessment Manikin) were displayed on the screen, on which participants provided a subjective rating of the valence and arousal of their emotional experience after the image was shown. After the answers, there was a short pause (four seconds) before the next trial started. After each block of 30 trials, participants were able to take a longer break. The test was administered using a personal computer.

The method of data collection was non-invasive and did not impose a significant burden on the participants. Participants may have experienced fatigue or tiredness due to the length of the tasks, which was addressed by taking short breaks between tasks. We stressed that participants could stop the study at any time without consequences as the emotionally saturated photographs may cause fear, anxiety, or disgust. After the experiment, a brief relaxation and emotional release procedure was carried out with each participant. Participants' well-being was also checked during the task and, if necessary, the experience of the images was discussed with them at the end of the task. The entire experiment lasted around 120 to 180 minutes.

The valence and arousal responses, but not the physiological measurements, of the EmReg 23 study were used for the present study as we were interested in the relationship of mindfulness with subjective momentary affective well-being rather than physiological indicators.

Mindfulness Measures

The EmReg 23 results were enriched by two mindfulness questionnaires to address the question of how mindfulness affects momentary affect and moderates emotion regulation outcomes. We used the Kentucky Inventory of Mindfulness Skills and the self-developed Mindfulness Practice Questionnaire.

Kentucky Inventory of Mindfulness Skills (KIMS)

Assessing mindfulness presents a multifaceted challenge. Self-report questionnaires are commonly used for assessment, exhibiting reasonable psychometric properties (Baer et al., 2006). The absence of a universally accepted definition of the multifaceted structure of mindfulness, however, makes it complex to design measures that comprehensively evaluate all facets. Some authors argue that the Five Facet Mindfulness Questionnaire (FFMQ) is the most suitable measure for detecting changes in mindfulness abilities (Caletti et al., 2020). Its

five-factor structure has been supported and recommended by many studies (Christopher et al., 2012; Sugiura et al., 2012).

Critics, however, point out that the FFMQ's differentiation between non-reacting and non-judging facets may not hold in samples with limited meditation experience. For instance, Karl and Fischer (2020) did not find distinct non-judging and non-reacting components in such samples, suggesting that these facets might merge into a more generic factor of acceptance. Given our sample of non- and novice mindfulness practitioners, this study employed the four-facet Kentucky Inventory of Mindfulness Skills (KIMS) questionnaire to measure participants' mindfulness levels.

The KIMS was developed as a self-report measure specifically applicable to populations without meditation experience. It is a widely used self-report instrument designed to assess four facets of mindfulness, including observing, describing, acting with awareness, and acceptance of inner experience (Baer et al., 2004). Previous research has demonstrated the utility of the KIMS in various settings, including clinical interventions, experimental studies, and correlational research (Baer et al., 2004).

The KIMS consists of 39 items rated on a 5-point Likert scale, ranging from 1 (rarely or never true) to 5 (almost always or always true). Respondents indicate the extent to which each item reflects their typical behavior or experience. The questionnaire yields separate scores for each mindfulness skill (observing, describing, acting with awareness, and acceptance of experience) (Baer et al., 2004). It has been shown to demonstrate good psychometric qualities, such as reliability and validity, and was translated into Slovene, the language in which our study was conducted (Höfling et al., 2011).

The KIMS assesses mindfulness both as a stable personality trait and its sensitivity to changes resulting from mindfulness practice. Empirical evidence from intervention and longitudinal studies consistently demonstrates its efficacy in capturing these changes. This

dual capability renders the KIMS a valuable tool for assessing inherent mindfulness traits and monitoring improvements due to mindfulness practice (Baer et al., 2004).

Mindfulness Practice Questionnaire

There has, however, been skepticism about the discriminant validity of self-reported mindfulness questionnaires. Some studies have failed to find differences in self-reported mindfulness skills between experienced meditators (with more than 10,000 hours of practice) and non-meditators using widely-used mindfulness questionnaires (excluding the KIMS). This lack of differentiation could be attributed to the heightened self-awareness of experienced meditators regarding their non-mindfulness states (Goleman & Davidson, 2018). Individuals undergoing mindfulness training appear to undergo a "response shift" over time, altering their perceptions and understanding of mindfulness, which complicates the interpretation of longitudinal data (Goleman & Davidson, 2018). Moreover, biases such as social desirability and response set biases may potentially distort assessment outcomes. Hence, Goleman and Davidson (2018) strongly advocate for supplementing self-report questionnaires with estimates of participants' accumulated mindfulness practice to enhance the quality of data.

Therefore, in addition to the Kentucky Inventory of Mindfulness Skills (KIMS), we developed the Mindfulness Practice Questionnaire (MPQ), which assesses individuals' involvement in various contemplative practices aimed at cultivating mindfulness. The MPQ comprises questions in which participants assess their overall meditation practice over the course of their lives as well as their practice of other contemplative mindfulness practices such as yoga, prayer, journaling, or Tai Chi. The combined result constitutes their overall lifetime practice.

While there is no perfect measurement of mindfulness to date, the inclusion of the KIMS and MPQ allows us to explore how self-reported mindfulness skills and overall mindfulness practice relate to momentary affective well-being and emotion regulation.

Data Protection

All data and results for each participant were stored under a research code that prevented identification of individual participants. The link between research codes and participant identities was password-protected and stored separately from the collected results. Participants were informed about data protection measures in the informed consent form.

Potential Risks

Participation in the EmReg 23 study posed minimal risks to participants. Feelings of fatigue and tiredness were common due to the length of the experiment and were mitigated by providing breaks and offering refreshments such as drinks and fruit bars. The use of emotionally intense photographs could cause feelings of disgust, anxiety, or fear. Participants were informed about the nature of the stimuli and potential emotional responses through the invitation, informed consent, and verbal explanations before the study. They could assess whether participation might be too burdensome based on this information and the training provided. Participants were free to withdraw from the study at any time if they found the experience too stressful, as stated in the informed consent and reiterated verbally before the study began. Further participants' well-being was monitored during the task, and any distress was discussed at the end of the task. A brief relaxation and emotional release procedure in form of a guided meditation was conducted with each participant after the experiment ended.

Participation in the mindfulness questionnaires (KIMS and MPQ) also posed no significant risks. However, completing these questionnaires might inadvertently highlight unresolved issues or challenges in mindfulness practice, potentially leading to feelings of inadequacy or self-judgment. Informed consent procedures and the option to withdraw at any time were in place to minimize these risks and prioritize participant well-being.

Data Preprocessing

Data preprocessing and analysis were performed using RStudio. Data from the EmReg 23 study and the mindfulness questionnaires were merged using a matching process based on participant identifiers, allowing for a comprehensive analysis.

The data underwent thorough cleaning to address missing values, ensuring that only participants with complete data for both the EmReg 23 study and mindfulness questionnaires were included. The data was confirmed to follow a normal distribution, and no outliers were identified for removal.

For each participant, average KIMS scores for the mindfulness skills of observing, describing, acting with awareness, and accepting were computed. Participants' reports of mindfulness practices from the MPQ were aggregated into a single measure representing lifetime practice (total accumulated mindfulness practice over their life).

Additionally, for each participant, momentary affect was assessed by calculating average valence and arousal responses across each of the four EmReg23 conditions (reappraisal, distancing, expressive suppression, and viewing). This included measuring general affective responsivity by averaging responses to both neutral and negative stimuli, as well as negative affective reactivity, which quantified the difference between responses to neutral and negative stimuli to account for the specific impact of negative stimuli on momentary affective well-being.

Furthermore, the effectiveness of each emotion regulation strategy was determined for each participant. This calculation entailed dividing the average negative affective reactivity observed during each strategy by that observed during the viewing control condition.

Data Analysis

The data analysis unfolded in three primary steps. Initially, we examined the influence of mindfulness on momentary affect, both directly and through emotion regulation strategies, across all participants. Subsequently, to delve into effects particular to mindfulness

practitioners, we narrowed our focus to these individuals who reported engaging in mindfulness practice. Finally, we conducted t-tests to compare momentary affective well-being responses between participants who did and did not engage in mindfulness practices.

Analysis Including All Participants

Firstly, we explored the impact of mindfulness on momentary affect across all participants. Multiple regression analyses were employed to examine whether mindfulness (assessed through the four KIMS skills and lifetime practice) predicted momentary affect, both in terms of general affect and negative affective reactivity.

Furthermore, to evaluate the moderating effect of mindfulness on the effectiveness of emotion regulation, we investigated how mindfulness influenced the efficacy of emotion regulation strategies (reappraisal, distancing, and suppression) in managing negative affective reactivity compared to the viewing control condition. For each strategy, momentary affect was individually predicted by mindfulness along with a constant predictor (value = 1). Subsequently, the two regression models were compared using ANOVA to assess the moderation effect of mindfulness on emotion regulation outcomes.

Here we focused on the effect of mindfulness on affective responses to negative stimuli rather than general stimuli because negative experiences evoke stronger responses, are closely linked to mental health issues, and mindfulness is designed to help manage them (Kabat-Zinn, 1990). This targeted approach allows for a clearer understanding of mindfulness mechanisms and their practical applications in improving psychological well-being.

Analysis Including Practitioners Only

The same analyses were exclusively conducted on the subset of 46 participants out of the total 63 who reported engaging in mindfulness practices. This investigation aimed to assess whether experience with mindfulness practice, as posited by the Dynamic Model of Mindfulness, influences the impact of mindfulness on momentary affective well-being and emotion regulation.

Comparing Practitioners and Non-Practitioners

To further explore potential differences between practitioners and non-practitioners, t-tests were conducted to compare the negative affective reactivities of the two groups within each emotion regulation strategy.

Again, we focused on the effect of mindfulness on affective responses specific to negative stimuli because these evoke stronger responses, are closely linked to mental health issues, and mindfulness is designed to help manage them (Kabat-Zinn, 1990).

G*Power Analysis

G*Power analysis indicated that the study lacked a sufficient number of participants to reliably detect medium or small effect sizes across all analyses. With a total of 63 participants, more than 90 participants would have been needed for each test to reliably detect medium effect sizes.

Relaxed Significance Level

Due to the limited sample size and consequently low statistical power of this study, it was anticipated that many effects might not reach the conventional significance threshold of $p < 0.05$. To capture potentially meaningful relationships and minimize the risk of Type II errors, findings with a significance level of $p < 0.1$ are reported and discussed in addition to those meeting the traditional threshold.

It is important to note that the p-value threshold of 0.1 does not imply definitive evidence of an effect, but rather suggests a trend or potential association worth further investigation. Findings with p-values between 0.05 and 0.1 must be interpreted with caution and considered preliminary until replicated in larger samples or confirmed by subsequent research.

Interactions

Given the limited statistical power, we decided not to test for interactions between monitoring and acceptance skills of mindfulness. Including interaction terms would have

increased model complexity and the risk of overfitting, potentially leading to unreliable results. Further, previous research by Simione et al. (2021) did not find interaction effects, despite theoretical support from Lindsay and Creswell (2017). Therefore, we focused on main effects to maintain the parsimony and interpretability of our findings.

Results

Results for All Participants

Mindfulness & Momentary Affect

To test the direct effect of mindfulness on momentary affect for all participants, regardless of whether they reported having practiced or not, we predicted affective responsivity by mindfulness.

First, we calculated overall responses in the viewing condition for all stimuli, using the averaged responses to negative and neutral stimuli (a_a for arousal and a_v for valence) as a measure of participants' general affective responsivity. To explore the factors affecting individual differences in general affective responsivity, we employed linear mixed regression analysis with a_a and a_v as predicted by mindfulness (the four KIMS skills: observing, describing, acting with awareness, accepting, and the MPQ reported lifetime practice).

Among all the mindfulness factors, only the monitoring skill of acting with awareness showed a trend towards predicting overall valence levels ($\beta = -0.32$, $p = 0.08$) (see Table 1.1 in the Appendix), suggesting that higher levels of acting with awareness were associated with lower levels of pleasantness. Overall arousal responses were not significantly predicted by any mindfulness factor (see Table 1.2 in the Appendix).

Next, we computed the mean assessments of valence and arousal of negative and neutral stimuli for each participant in the viewing condition. The difference between the responses to negative and neutral stimuli (d_a for arousal and d_v for valence) was considered a measure of participants' negative affective responsivity. To explore the factors affecting individual differences in affective responsivity, we used standard linear regression analysis with d_a and d_v predicted by mindfulness (the four KIMS skills and the MPQ reported lifetime practice).

No significant prediction was found for d_v (see Table 1.3 in the Appendix). However, d_a was predicted by acting with awareness ($\beta = 0.84$, $p = 0.05$) (see Table 1.4 in the

Appendix), indicating that higher levels of the monitoring skill of acting with awareness were associated with higher perceived intensity of negative stimuli.

Mindfulness & Emotion Regulation

We further investigated whether mindfulness moderates the effects of emotion regulation. For each emotion regulation strategy (reappraisal, distancing, and suppression), we calculated linear regression models both with and without mindfulness as a predictor, then compared these models using ANOVA.

Initially, we computed the mean assessments of valence and arousal for negative and neutral stimuli for each participant under each emotion regulation condition. The overall averaged responses to negative and neutral stimuli in each condition (arousal: a_{ac} , valence: a_{vc}) served as measures of participants' general affective responsivity. Subsequently, we computed two standard linear regression models for each emotion regulation strategy. In the first model, a_{ac} and a_{vc} were predicted by mindfulness, which included the four KIMS skills and MPQ-reported lifetime practice. The second model used a constant factor as the predictor. We then compared the models for each condition using ANOVA to determine if the models including mindfulness facets explained a significantly larger proportion of individual variability in affective responsivity.

The results showed no significant effects of mindfulness moderating the effectiveness of emotion regulation strategies for either valence or arousal outcomes across all strategies (see Table 1.5 in the Appendix). The coefficients for mindfulness predictors were non-significant in all models, indicating that, in this sample, mindfulness did not moderate the effectiveness of emotion regulation strategies.

Results for Practitioners

Mindfulness & Momentary Affective Well-being

Next, we tested if the effect of mindfulness on momentary affect is different if only individuals reporting mindfulness practice were studied. For practitioners exclusively, we

again calculated averaged responses to negative and neutral stimuli in the viewing condition (a_a for arousal and a_v for valence) as a measure of participants' general affective responsivity. We then explored the factors affecting individual differences among practitioners by employing linear mixed regression analysis, with a_a and a_v predicted by mindfulness (KIMS skills and lifetime practice).

Acceptance showed a trend of predicting a_v ($\beta = 0.16$, $p = 0.08$) (see Table 2.1 in the Appendix), indicating that acceptance skills improved the pleasantness of overall stimuli. Additionally, the monitoring skill of describing negatively predicted a_v ($\beta = -0.26$, $p = 0.01$) (see Table 2.1 in the Appendix), suggesting that the ability to describe experiences with clarity and precision was associated with greater perceived unpleasantness of sensations. Once more, a_a was not significantly predicted by mindfulness (see Table 2.2 in the Appendix).

Next, we computed the mean assessments of valence and arousal for negative and neutral stimuli specifically for practitioners in the viewing condition. The difference between responses to negative and neutral stimuli (d_a for arousal and d_v for valence) was considered a measure of participants' negative affective responsivity. We explored the factors affecting individual differences in affective responsivity using standard linear regression analysis, with d_a and d_v predicted by mindfulness (the four KIMS skills and the MPQ reported lifetime practice).

No significant prediction was found for d_v (see Table 2.3 in the Appendix). However, d_a showed a trend of being negatively predicted by acceptance skills ($\beta = -0.55$, $p = 0.08$) (see Table 2.4 in the Appendix). This suggests that acceptance skills reduced the perceived intensity of stimuli among mindfulness practitioners in our sample.

Mindfulness & Emotion Regulation

Furthermore, we investigated the moderating role of mindfulness in the effectiveness of emotion regulation strategies among the subgroup of practitioners, using the same methodology as employed for all participants.

Our findings again revealed no moderating effects of mindfulness on the efficacy of emotion regulation strategies across all strategies (see Table 2.5 in the Appendix). This indicates that, within this sample, mindfulness does not play a role as a moderator in the effectiveness of emotion regulation strategies.

Results for Comparison of Practitioners and Non-practitioners

We further compared practitioners and non-practitioners directly regarding their momentary affect across the four emotion regulation conditions (reappraisal, distancing, suppression and viewing).

We used previously computed differences between responses to negative and neutral stimuli for each condition (d_{ac} for arousal and d_{vc} for valence) as a measure of participants' negative affective responsivity in both groups. To explore differences in affective responsivity between the two groups, we conducted t-tests.

The tests revealed no significant distinctions in d_{ac} and d_{vc} across all conditions (see Table 3 in the Appendix). These findings suggest that engaging in mindfulness practice did not significantly influence negative affective responsivity in our experiment.

Discussion

While it is widely accepted that mindfulness benefits well-being, recent research has also highlighted its potential adverse effects. The specific mechanisms through which mindfulness impacts well-being, however, remain debated. Two principal theories have been proposed: the top-down Mindfulness-to-Meaning Theory, which suggests enhanced emotion regulation through improved cognitive abilities, and the bottom-up Monitor-and-Acceptance Theory, characterized by reduced reactivity to emotion-eliciting stimuli (Wenzel et al., 2020).

This study aims to ascertain which theory best elucidates the mechanisms underlying mindfulness. We examined how variations in mindfulness skills—specifically the abilities to monitor and accept present experiences—affect momentary affective well-being both directly and by moderating successful emotion regulation. Mindfulness was assessed as a trait that can evolve through practice, measured both through self-reports and, due to methodological constraints, cumulative lifetime practice. Momentary affective well-being was assessed through participants' valence and arousal ratings in response to affective picture stimuli. Due to the affective quality of the stimuli used in our study, enhanced momentary affective well-being was conceptualized as increases in positive valence and decreases in arousal ratings. Momentary affective well-being is known to influence general affective well-being through accumulation.

We theorized that if the Mindfulness-to-Meaning Theory best fits our data, mindfulness, as a top-down process, would moderate the effectiveness of top-down emotion regulation strategies in improving momentary affect due to enhanced cognitive regulation abilities (Wenzel et al., 2020; Garland et al., 2015). Additionally, increases in the monitoring skills of mindfulness should independently enhance affective well-being, even without corresponding changes in acceptance skills, as heightened awareness facilitates a greater experience of meaning and purpose.

Conversely, we expected that if the Monitor-and-Acceptance Theory better fits our data, mindfulness, as a bottom-up process, would reduce the influence of top-down emotion regulation on momentary affect by promoting acceptance (Wenzel et al., 2020), as according to Gross (2013), mindfulness acts earlier in the regulation process than top-down strategies. Furthermore, while monitoring skills should intensify the experience of any given quality, including negative, acceptance would enhance the overall pleasantness of these experiences.

In this discussion, we explore the implications of our findings, methodological considerations, limitations, and avenues for future research. Due to an insufficient number of participants to reliably detect medium or small effect sizes, we relaxed the significance threshold to $p < 0.1$ to capture potentially meaningful relationships. It is crucial to interpret these results as preliminary until they are replicated in larger samples or confirmed by subsequent research.

In the following discussion, we will address our two hypotheses and present general observations derived from our study. We will then conclude by evaluating which mindfulness theory best aligns with our data.

Mindfulness and Affective Well-being

Our first hypothesis posited that among our sample of non- and novice practitioners, enhanced acceptance skills improve momentary affective well-being, while heightened monitoring skills tend to decrease momentary affective well-being. Although some relationships between mindfulness and momentary affect remained insignificant, our results largely support this notion.

Specifically, our findings suggest that monitoring skills in mindfulness, when showing an effect, generally decrease momentary affective well-being. Notably, higher levels of the monitoring skill acting with awareness were associated with perceiving increased negative valence of general stimuli and increased arousal to negative stimuli across all participants.

Additionally, the monitoring skill describing was linked to a greater negative valence rating of overall stimuli among mindfulness practitioners.

Moreover, our results indicate that the beneficial effects of mindfulness appear to be solely driven by acceptance. Acceptance not only increased positive valence ratings for overall stimuli but also reduced arousal to negative stimuli. However, these effects of acceptance were observed exclusively in participants actively practicing mindfulness.

Our observations are consistent with findings from Simione et al. (2021), who reported that while monitoring predicts ill-being, the beneficial effects of mindfulness on psychological outcomes depend mostly on acceptance. This supports the Monitor-and-Acceptance Theory, which posits that while the ability to focus attention on specific stimuli (monitoring) is necessary, it alone is insufficient for improving well-being. Focusing on sensations may heighten awareness of negative experiences; therefore, individuals also need to adopt an accepting stance toward these sensations to reduce affective reactivity. This underscores the crucial role of acceptance in effectively regulating affect (Lindsay & Creswell, 2017).

Mindfulness Affects Both Valence and Arousal

Our observations, that mindfulness influences both valence and arousal contradict previous studies by Lu et al. (2023), Zorn et al. (2020), and Perlman et al. (2010), who found that mindfulness only improves positive valence of negative stimuli, while not influencing arousal. These differences in findings might be due to several reasons. Firstly, previous studies like those by Zorn et al. (2020) and Perlman et al. (2010) primarily used thermal-induced pain as the negative emotional stimulus. Thermal pain stimuli primarily elicit a physiological response, activating the body's nociceptive pathways, and may have limited emotional content beyond the sensation of pain itself. Our study however, used visual stimuli, including pictures designed to elicit emotional responses. Visual stimuli can engage cognitive and affective processes beyond mere sensory perception, potentially influencing both valence

and arousal differently compared to physical pain stimuli. It might, therefore, be that the effect of mindfulness on momentary affect is partly mediated by the nature of the stimuli.

Secondly, significant variations in participants' experiences with mindfulness practices were evident across studies. Research by Zorn et al. (2020) and Perlman et al. (2010) shows that individuals with extensive meditation experience (>10,000 hours) report reduced unpleasantness and greater sensory-affective uncoupling in response to pain compared to novices (<20 hours), particularly during prolonged painful experiences. Lu et al. (2023) also observed that long-term mindfulness training allows for disassociation of pain perception from cognitive-affective processing, reducing suffering from reactivity. In our experiment, monitoring skills heightened arousal responses primarily among novices or non-practitioners, with these effects diminishing among experienced mindfulness practitioners. This suggests that early-stage mindfulness practice may initially increase intensity perception of negative stimuli, but as practice progresses, negative effects subside and acceptance improves, enhancing affective well-being. This dynamic aligns with the Dynamic Model of Mindfulness, which posits that mindfulness effects on well-being evolve with proficiency (Lu et al., 2023).

Mindfulness Practice Effect

However, no direct influence of mindfulness practice on momentary affective well-being measures was found, despite the noted differences between the subgroup of practitioners and the entire group. Firstly, direct comparisons between practitioners and non-practitioners regarding momentary affect using t-tests were not significant. Secondly, lifetime mindfulness practice, which measures accumulated experience over one's life, did not significantly impact momentary affect in our sample.

These null findings may result from the absence of truly experienced mindfulness practitioners and the small sample size in our study. While the reduced power of our study did not reliably capture small and medium effect sizes, it is unlikely that our sample of non-

practitioners and novices would have revealed stronger effects. Previous research, such as Zorn et al. (2020), defined experienced practitioners as having over 10,000 hours of mindfulness practice and focused on narrowly defined formal meditation techniques. In contrast, our sample had practitioners with an average of only 2,000 hours of mindfulness practice, including a broad range of non-formal practices like yoga, journaling, or music. This broader conceptualization is atypical in mindfulness research, where such diverse practices may influence mindfulness and well-being in varied and potentially diluted ways (Goleman & Davidson, 2018).

We chose this approach because our sample had very few formal meditation practitioners (only 6 with minimal experience) and we tried to account for the limitations of self-reported mindfulness skills in measuring momentary affect. Although it is possible that mindfulness practice had a small true effect in our sample (Kabat-Zinn, 1990), our study lacked the power to detect it.

Mindfulness Differently Affects Valence and Arousal

Another intriguing finding that surfaced from our study pertains to the different influences mindfulness has on general and negative affective responsivity. Surprisingly, while for negative emotional stimuli mindfulness appeared to exclusively influence arousal responses, for general stimuli (including both neutral and negative ones) it exclusively affected valence responses. This suggests a different effect of mindfulness on negatively stimuli then on neutral stimuli, warranting further investigation.

This observed pattern seems to be rooted in our data analysis approach. For calculating the negative affective responsivity, we subtracted responses to neutral from responses to negative stimuli. Our data shows that thereby any difference in valence responses to negative and neutral pictures has been nullified. This cancellation effect implies that mindfulness's influence on momentary valence experience is independent of the quality of the stimuli, rather than specifically alters for negative stimuli.

Conversely, our findings indicate that mindfulness's impact on arousal perceptions is notably stronger for negative stimuli compared to neutral ones, to the extent that significant effects are only evident when exploring the disparity between the two types of stimuli. Given that negative stimuli inherently elicit higher arousal levels than neutral ones, it appears that mindfulness's effect on arousal intensifies with the stimulus's emotive quality in our sample of novice and non-practitioners. While early-stage mindfulness practice tends to heighten the perception of intensity in response to negative stimuli due to increased monitoring skills, this effect is expected to diminish with continued practice (Lu et al., 2023; Kabat-Zinn, 1990).

To our knowledge, no previous research has reported an interaction effect between stimuli quality and facets of mindfulness. These findings underscore the intricate interplay between mindfulness and affective processing, emphasizing not only individual differences in mindfulness skills but also considering stimulus characteristics.

Comparison of Theories

Our second hypothesis proposed a moderation effect of mindfulness on emotion regulation outcomes. However, the results did not show a significant effect. Mindfulness did not predict emotion regulation outcomes significantly, neither in the overall sample nor in the subgroup of practitioners. Therefore, hypothesis 2 could not be supported.

These findings align with previous research by Wenzel et al. (2020), Simione et al. (2021), and Lindsay & Creswell (2017) and the Monitor-and-Acceptance Theory, suggesting that mindfulness reduces reactivity to experiences and therefore diminishes the need for effortful emotion regulation. Further, the Monitor-and-Acceptance Theory, finds support in our observation that the beneficial effects of mindfulness on momentary affective well-being are solely due to acceptance, while heightened monitoring skills tend to decrease well-being.

In contrast, our study did not support the Mindfulness-to-Meaning Theory, as monitoring skills did not improve momentary affective well-being, and mindfulness did not significantly moderate emotion regulation outcomes. However, this conclusion must be

considered in light of significant limitations in our study design. Given that our participants were primarily novices and non-practitioners, any existing effect sizes were likely smaller than our study's power to detect. This limitation applies not only to potential moderating effects of mindfulness but also to possible positive effects of monitoring skills on momentary affect. Thus, while our data suggest a tendency toward supporting the Monitor-and-Acceptance Theory, we cannot entirely dismiss the Mindfulness-to-Meaning Theory.

However, since the Mindfulness-to-Meaning and Monitor-and-Acceptance theories represent different stages in the process model of emotion regulation, they need not be mutually exclusive. According to the Dynamic Model of Mindfulness, both theories could be valid at different levels of mindfulness proficiency (Lu et al., 2023).

The Dynamic Model of Mindfulness is based on the observation that individuals with less mindfulness experience struggle to maintain a mindful focus on pain and report higher pain scores. In contrast, those with advanced mindfulness skills can remain present with their pain while reporting lower pain scores, as they can separate pain perception from cognitive and emotional reactions, focusing solely on the immediate pain experience (Lu et al., 2023).

According to Lu et al. (2023), the influence of mindfulness on affective well-being develops with increasing proficiency. For beginners, mindfulness might primarily enhance cognitive regulation, resulting in pain relief. In contrast, advanced practitioners achieve pain relief through acceptance, which mitigates cognitive-affective resistance (Lu et al., 2023).

The Dynamic Model of Mindfulness suggests that the Mindfulness-to-Meaning Theory best describes the early stages of mindfulness, while the Monitor-and-Acceptance Theory is more applicable to experienced practitioners. Although this model was originally proposed to explain mindfulness's pain-relieving effects, our data suggest it might also elucidate broader effects on affective well-being. Consistent with this idea, our study revealed that improvements in momentary affect through acceptance were observed only among

participants with a mindfulness background. Additionally, the impact of monitoring on arousal diminished among those with more extensive mindfulness experience.

Nevertheless, our findings do not fully align with the Dynamic Model of Mindfulness. For early-stage practitioners, where the Mindfulness-to-Meaning Theory is expected to apply, we did not observe the anticipated moderation effects on emotion regulation or improvements in momentary affect due to monitoring skills. One possible explanation is that Lu et al. (2023) concentrated specifically on mindfulness's analgesic effects. Since mindfulness impacts can vary with different types of stimuli, the Dynamic Model might require refinement to encompass a broader range of stimuli. Another possibility is that these discrepancies may be attributed to limitations in our sample size and study design.

Therefore, this study serves as an initial exploration. Future research should build upon these findings, address existing limitations, and consider variations in stimuli and proficiency to further clarify how mindfulness influences well-being.

Limitations

With only 63 participants, our study lacked sufficient statistical power to detect subtle but potentially meaningful effects of small to medium size. This limited power increases the risk of Type II errors, where true effects may go undetected due to insufficient sensitivity in the analysis. To address this issue, we relaxed the significance threshold to $p < 0.1$. While this approach can be appropriate for preliminary studies, it also raises the risk of Type I errors, increasing the likelihood of incorrectly rejecting the null hypothesis from 5% to 10%.

Given the limited power of our study, we chose not to examine interactions between monitoring and acceptance skills and their effects on well-being. Including interaction terms would have added complexity to the model and increased the risk of overfitting, potentially leading to unreliable results. By concentrating on the main effects of these two mindfulness skills on momentary affective well-being, we acknowledge that we may have overlooked significant interaction effects. Consequently, we were unable to explore how the impact of

one skill might vary depending on the level of the other, possibly missing nuanced insights into their combined influence.

Moreover, our findings demonstrate that engaging in mindfulness practice shapes the mechanisms through which mindfulness enhances well-being. However, mindfulness is not solely a result of practice; it also represents a dispositional trait that varies significantly among individuals from birth. Our study did not distinguish between dispositional mindfulness and mindfulness skills acquired through practice, as both were measured together by the KIMS. Consequently, we may have overlooked potential interaction effects between the origin of mindfulness abilities (inherent disposition or trained skills) and their impact on well-being.

Additionally, the EmReg23 experiment, on which this study builds, was not specifically designed to test theories related to momentary affective well-being and emotion regulation within the mindfulness context. This limitation frames our mindfulness perspective as a preliminary exploration rather than a conclusive investigation.

Furthermore, mindfulness was assessed solely through self-reports. Although common, this method can introduce biases, such as social desirability, lack of self-awareness, or misinterpretation of questions, which may affect data accuracy. Reliance on self-reports also overlooks potential objective measures of mindfulness, such as physiological indicators or behavioral assessments, which could offer a more comprehensive understanding.

Lastly, all participants were first-year psychology students, which limits the generalizability of our findings. The sample's homogeneity in characteristics and mindfulness experience, particularly concerning formal meditation practice, restricts the applicability of the results to broader populations.

These limitations highlight the need for caution in interpreting the findings and underscore the importance of designing future studies with these considerations in mind to achieve more robust and generalizable insights.

Outlook

Having laid the groundwork for exploring the mechanisms through which mindfulness impacts well-being in response to visual stimuli, future research endeavors will be essential to validate and expand upon our findings.

To achieve this, employing larger and more diverse sample sizes would be advantageous in confirming and extending our observations, thereby enabling more robust conclusions regarding the influence of mindfulness on affective processing. Conducting power analyses a priori can assist in determining the sample size required to detect effects of a certain magnitude with adequate confidence, thereby enhancing the rigor and reliability of future studies in this domain. Furthermore, careful selection of the sample to encompass predefined variability in standardized mindfulness practices, encompassing both experts and novices, can bolster the robustness and generalizability of the study's findings. Integrating different types of mindfulness practices could further enhance our understanding of their differential impacts on well-being.

Moreover, future research could delve deeper into understanding how the effects of mindfulness vary depending on different types of stimuli. For example, investigating whether mindfulness affects arousal perceptions similarly for positive stimuli as it does for negative ones could unveil nuanced aspects of affective processing. Additionally, exploring disparities in mindfulness effects on pain-inducing stimuli, such as heat, compared to unpleasantness-inducing stimuli like affective pictures or noise, warrants further exploration. Understanding how mindfulness influences the perception and processing of diverse stimuli types holds promise for its application across various domains, from pain management to emotional regulation.

Additionally, our study, congruent with the findings of Lu et al. (2023), underscores that the effects of mindfulness undergo dynamic changes contingent upon levels of mindfulness proficiency. This underscores the importance of pinpointing specific time points

during mindfulness practice when shifts in brain and behavior are most likely to occur. Future studies could benefit from enrolling participants with no prior mindfulness experience and implementing a series of assessments that gather both behavioral and neuroscience data over an extended period of mindfulness training (Lu et al., 2023). For instance, conducting weekly measurements from the initial assessment through the end of the training period could yield valuable insights. It is crucial to integrate various internal and external outcome measures that also change over time and might influence the progression of mindfulness training performance. Including interaction effects between monitoring and acceptance skills would enrich our understanding of mindfulness's multifaceted impacts. This approach could elucidate the onset and development of behavioral and neural changes induced by mindfulness, leading to a clearer understanding of the mechanisms underlying mindfulness-based effects (Lu et al., 2023). Additionally, it may inform the clinical application of mindfulness by providing insights into the optimal duration, frequency, and dosage of interventions, such as using mindfulness for chronic pain management. By considering external and individual factors, this research could pave the way for subgroup-specific recommendations and more precise treatments (Lu et al., 2023).

Conclusion

This study set out to explore the complex effects of mindfulness on affective well-being, specifically examining how mindfulness influences momentary affect and interacts with top-down emotion regulation strategies. Our findings offer important insights into the underlying mechanisms of mindfulness, highlighting both its benefits and potential limitations.

Firstly, our results suggest that mindfulness impacts momentary affect in nuanced ways. The monitoring skill, which involves focused attention on present experiences, was associated with increased arousal to negative stimuli and decreased positive valence of overall stimuli. Conversely, acceptance skills, which involve non-judgmental acknowledgment of sensations, were found to enhance positive valence and reduce arousal, with these effects being prominent only among active mindfulness practitioners. This supports the Monitor-and-Acceptance Theory, which posits that mindfulness reduces reactivity to experiences and diminishes the need for effortful emotion regulation through acceptance (Lindsay & Creswell, 2017).

Interestingly, we found that mindfulness did not moderate the effectiveness of top-down emotion regulation strategies, which contradicts the Mindfulness-to-Meaning Theory. This theory suggests that mindfulness enhances cognitive regulation abilities, thereby improving top-down emotion regulation outcomes (Garland et al., 2015). Our findings indicate that while monitoring skills may heighten the experience of emotions, they do not necessarily improve well-being unless coupled with acceptance skills.

Theoretical Implications

The results of this study lend more support to the Monitor-and-Acceptance Theory over the Mindfulness-to-Meaning Theory. However, our findings also partially align with the Dynamic Model of Mindfulness proposed by Lu et al. (2023). This model suggests that the effects of mindfulness on well-being change dynamically with practice proficiency, where

early stages of mindfulness practice may enhance cognitive regulation, but advanced practice leads to reduced cognitive-affective interference. This dynamic perspective helps reconcile the apparent contradictions between the two theories by considering the evolution of mindfulness skills over time.

Methodological Considerations and Limitations

The study's methodological approach, including a laboratory experiment with self-reported measures of mindfulness and momentary affect, provides valuable initial insights but also comes with limitations. The small sample size and the predominance of novice practitioners limit the generalizability of the findings. Additionally, the broad conceptualization of mindfulness practices, which included non-meditative activities like yoga and journaling, may have diluted the specific effects of formal meditation practice.

Future research should aim for larger, more diverse samples and standardized mindfulness practice definitions to enhance the robustness of the findings. Additionally, future studies should explore the longitudinal effects of mindfulness practice, examining how changes in proficiency influence affective outcomes over time. Investigating different types of stimuli and their interactions with mindfulness skills can also provide deeper insights into the mechanisms at play. Furthermore, integrating objective measures of mindfulness, such as physiological indicators, could complement self-reports and offer a more comprehensive understanding of its effects.

Practical Applications

Understanding the differential impacts of mindfulness skills has significant implications for designing mindfulness-based interventions. The nuanced effects of monitoring skills suggest that training should be carefully tailored to avoid unintended increases in emotional arousal. To mitigate this, training programs should emphasize acceptance skills, which can potentially maximize benefits for affective well-being. This approach is particularly beneficial for those new to mindfulness practice, as beginners may

not yet have developed the capacity to manage the heightened emotional arousal that can result from intense focus on present experiences. Acceptance skills help individuals approach their emotions with non-judgmental awareness, reducing emotional reactivity and enhancing overall well-being.

In conclusion, this study contributes to the ongoing discourse on mindfulness and well-being by elucidating the roles of monitoring and acceptance skills and their interactions with top-down emotion regulation strategies. While the findings predominantly support the Monitor-and-Acceptance Theory, they also highlight the potential for a dynamic understanding of mindfulness effects, encouraging a more integrative approach to future research.

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Appendix

Table 1.1

Linear Mixed Regression Analysis: Impact of Mindfulness on Valence Responses to Neutral and Negative Stimuli in the Viewing Condition for All Participants

Random effects:

Groups	Name	Variance	Std.Dev.
subject	(Intercept)	0.12	0.34
Residual		0.66	0.81

Number of obs: 126, groups: subject, 63

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)	
(Intercept)	4.15	0.76	58.05	5.5	9e-07	***
s_valenceN	2.79	0.14	62.00	19.3	<2e-16	***
Accept_without_judgement	0.12	0.11	57.00	1.1	0.30	
Act_with_awareness	-0.32	0.18	57.00	-1.8	0.08	.
Describe	-0.19	0.12	57.00	-1.5	0.13	
observe	0.02	0.17	57.00	0.1	0.92	
lifetime_practice	0.00	0.00	57.00	-0.8	0.42	

Note. The linear mixed model has a total number of 63 subjects and 126 observations. The

REML criterion at convergence is 349.1.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 1.2

Linear Mixed Regression Analysis: Impact of Mindfulness on Arousal Responses to Neutral and Negative Stimuli in the Viewing Condition for All Participants

Random effects:

Groups	Name	Variance	Std.Dev.
subject	(Intercept)	0.66	0.81
Residual		1.23	1.11

Number of obs: 126, groups: subject, 63

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)	
(Intercept)	3.78	1.28	57.69	3.0	0.004	**
s_valenceN	-3.19	0.20	62.00	-16.2	<2e-16	***
Accept_without_judgement	-0.25	0.19	57.00	-1.3	0.204	
Act_with_awareness	0.38	0.31	57.00	1.2	0.220	
Describe	0.26	0.21	57.00	1.3	0.211	
Observe	-0.03	0.29	57.00	-0.1	0.921	
lifetime_practice	0.00	0.00	57.00	1.0	0.310	

Note. The linear mixed model has a total number of 63 subjects and 126 observations. The

REML criterion at convergence is 447.8.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 1.3

Standard Linear Regression Analysis: Impact of Mindfulness on Valence Responses to Negative Stimuli in the Viewing Condition for All Participants

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.78	1.32	-1.3	0.2
Accept_without_judgement	0.05	0.20	0.3	0.8
Act_with_awareness	-0.19	0.32	-0.6	0.6
Describe	0.09	0.22	0.4	0.7
observe	-0.32	0.30	-1.1	0.3
lifetime_practice	0.00	0.00	0.8	0.4

Residual standard error: 1.2 on 57 degrees of freedom

Multiple R-squared: 0.035, Adjusted R-squared: -0.05

F-statistic: 0.41 on 5 and 57 DF, p-value: 0.84

Note. The standard linear regression model has a total number of 63 subjects.

Signif. codes: 0 '****' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 1.4

Standard Linear Regression Analysis: Impact of Mindfulness on Arousal Responses to Negative Stimuli in the Viewing Condition for All Participants

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.06	1.74	0.6	0.55
Accept_without_judgement	-0.35	0.26	-1.3	0.19
Act_with_awareness	0.84	0.42	2.0	0.05 .
Describe	0.40	0.29	1.4	0.16
Observe	-0.07	0.40	-0.2	0.86
lifetime_practice	0.00	0.00	-0.5	0.62

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.5 on 57 degrees of freedom

Multiple R-squared: 0.11, Adjusted R-squared: 0.029

F-statistic: 1.4 on 5 and 57 DF, p-value: 0.25

Note. The standard linear regression model has a total number of 63 subjects.

Table 1.5

ANOVA Results: Moderation Effect of Mindfulness on Emotion Regulation Outcomes for All Participants

Valence / Arousal	Emotion Regulation	Model	Residual DF	RSS	Sum of Squares	F-statistic	p-value
Valence	Reappraisal	1	35	2.28			
		2	40	2.42	-0.14	0.42	0.83
	Distancing	1	39	3.36			
		2	44	3.48	-0.13	0.29	0.91
	Suppression	1	34	1.81			
		2	39	2.10	-0.29	1.09	0.39
Arousal	Reappraisal	1	34	10.80			
		2	39	12.10	-1.30	0.82	0.55
	Distancing	1	39	3.74			
		2	44	4.05	-0.32	0.66	0.65
	Suppression	1	34	1.61			
		2	39	1.75	-0.14	0.60	0.70

Note. Model 1 represents the regression model with mindfulness as a predictor, and model 2 represents the constant predictor model. The Sum of Squares column represents the difference in the sum of squares between Model 1 and Model 2, indicating the effect of including mindfulness as a predictor. F-statistic and p-value indicate the significance of this effect. A significant sum of squares would suggest that the model with mindfulness as a predictor (Model 1) performs better in explaining the variance in the outcome variable compared to the model with the constant predictor (Model 2).

Table 2.1

Linear Mixed Regression Analysis: Impact of Mindfulness on Valence Responses to Neutral and Negative Stimuli in the Viewing Condition for Participants Reporting Mindfulness Practice

Random effects:

Groups	Name	Variance	Std.Dev.
subject	(Intercept)	4.6e-24	2.1e-12
Residual		4.3e-01	6.5e-01

Number of obs: 92, groups: subject, 46

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)	
(Intercept)	2.68	0.67	85.00	4.0	2e-04	***
s_valenceN	2.71	0.14	85.00	19.9	<2e-16	***
Accept_without_judgement	0.16	0.09	85.00	1.8	0.082	.
Act_with_awareness	0.10	0.17	85.00	0.6	0.549	
Describe	-0.26	0.10	85.00	-2.7	0.009	**
Observe	0.14	0.14	85.00	1.0	0.318	
lifetime_practice	0.00	0.00	85.00	-0.3	0.799	

Note. The linear mixed model has a total number of 46 subjects and 92 observations. The REML criterion at convergence is 210.3.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 2.2

Linear Mixed Regression Analysis: Impact of Mindfulness on Arousal Responses to Neutral and Negative Stimuli in the Viewing Condition for Participants Reporting Mindfulness Practice

Random effects:

Groups	Name	Variance	Std.Dev.
subject	(Intercept)	0.82	0.91
Residual		1.22	1.10

Number of obs: 92, groups: subject, 46

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)	
(Intercept)	4.57	1.74	40.35	2.6	0.01	*
s_valenceN	-3.13	0.23	45.00	-13.6	<2e-16	***
Accept_without_judgement	-0.34	0.24	40.00	-1.4	0.16	
Act_with_awareness	0.33	0.45	40.00	0.7	0.46	
Describe	0.24	0.25	40.00	1.0	0.34	
Observe	-0.10	0.35	40.00	-0.3	0.77	
lifetime_practice	0.00	0.00	40.00	0.7	0.51	

Note. The linear mixed model has a total number of 46 subjects and 92 observations. The REML criterion at convergence is 333.8.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 2.3

Standard Linear Regression Analysis: Impact of Mindfulness on Valence Responses to Negative Stimuli in the Viewing Condition for Participants Reporting Mindfulness Practice

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.39	1.54	-1.5	0.1
Accept_without_judgement	0.21	0.21	1.0	0.3
Act_with_awareness	-0.17	0.40	-0.4	0.7
Describe	-0.01	0.22	0.0	1.0
Observe	-0.18	0.31	-0.6	0.6
lifetime_practice	0.00	0.00	0.5	0.6

Residual standard error: 1.1 on 40 degrees of freedom

(17 Beobachtungen als fehlend gelöscht)

Multiple R-squared: 0.04, Adjusted R-squared: -0.08

F-statistic: 0.34 on 5 and 40 DF, p-value: 0.89

Note. The standard linear regression model has a total number of 46 subjects.

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 2.4

Standard Linear Regression Analysis: Impact of Mindfulness on Arousal Responses to Negative Stimuli in the Viewing Condition for Participants Reporting Mindfulness Practice

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.28	2.27	1.0	0.32
Accept_without_judgement	-0.55	0.31	-1.8	0.08 .
Act_with_awareness	0.50	0.58	0.9	0.40
Describe	0.48	0.33	1.5	0.15
observe	-0.07	0.46	-0.2	0.88
lifetime_practice	0.00	0.00	-0.4	0.72

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.6 on 40 degrees of freedom

(17 Beobachtungen als fehlend gelöscht)

Multiple R-squared: 0.12, Adjusted R-squared: 0.0045

F-statistic: 1 on 5 and 40 DF, p-value: 0.41

Note. The standard linear regression model has a total number of 46 subjects.

Table 2.5

ANOVA Results: Moderation Effect of Mindfulness on Emotion Regulation Outcomes for Participants Reporting Mindfulness Practices

Valence / Arousal	Emotion Regulation	Model	Residual DF	RSS	Sum of Squares	F-statistic	p-value
Valence	Reappraisal	1	24	2.06			
		2	29	2.18	-0.12	0.27	0.92
	Distancing	1	25	2.35			
		2	30	2.46	-0.11	0.24	0.94
	Suppression	1	25	0.79			
		2	30	0.92	-0.13	0.81	0.55
Arousal	Reappraisal	1	23	9.67			
		2	28	11.71	-2.05	0.97	0.46
	Distancing	1	25	2.87			
		2	30	3.01	-0.15	0.26	0.93
	Suppression	1	25	0.71			
		2	30	0.87	-0.17	1.19	0.35

Note. Model 1 represents the regression model with mindfulness as a predictor, and model 2 represents the constant predictor model. The "Sum of Squares" column represents the difference in the sum of squares between Model 1 and Model 2, indicating the effect of including mindfulness as a predictor. F-statistic and p-value indicate the significance of this effect. A significant sum of squares would suggest that the model with mindfulness as a predictor (Model 1) performs better in explaining the variance in the outcome variable compared to the model with the constant predictor (Model 2).

Table 3.1

T-Test Results: Impact of Mindfulness Practice on Emotion Regulation Outcomes for Emotional Stimuli

Condition	Dependent Variable	t-value	Df	p-value	95% CI Lower Bound	95% CI Upper Bound	Mean Group 1	Mean Group 0
Viewing	Valence	0.78	22.14	0.44	-0.49	1.09	-2.7	-3.01
	Arousal	-0.48	27.70	0.63	-1.16	0.71	3.13	3.35
Reappraisal	Valence	0.10	19.51	0.93	-0.68	0.75	-1.88	-1.92
	Arousal	0.32	25.08	0.75	-0.67	0.92	1.85	1.72
Distancing	Valence	1.43	16.09	0.17	-0.25	1.28	-1.55	-2.07
	Arousal	-0.27	21.81	0.79	-1.06	0.82	2.01	2.13
Suppression	Valence	0.36	9.65	0.73	-1.18	1.64	-2.36	-2.59
	Arousal	0.35	10.38	0.73	-1.40	1.93	2.9	2.65

Note. The table presents the results of Welch's Two-Sample t-tests conducted to compare the means of dependent variables between two groups (mindfulness practitioners vs. non-practitioners) within each experimental condition (viewing, reappraisal, distancing, and suppression). Positive t-values indicate higher means in Group 1 (practitioners, N=46), while negative t-values indicate higher means in Group 0 (non-practitioners, N=17). Degrees of freedom (df), p-values, and 95% confidence intervals (CI) are reported. Significant p-values ($p < .05$) are denoted in bold font.

Abstract (German)

Achtsamkeit, verstanden als aufmerksame und nicht wertende Konzentration auf das gegenwärtige Erleben, ist für ihre positiven Effekte auf das Wohlbefinden weithin anerkannt. Die Forschung zu den zugrunde liegenden Mechanismen ist jedoch uneindeutig. Eine prominente Theorie, die Mindfulness-to-Meaning-Theorie, postuliert, dass Achtsamkeit das Wohlbefinden fördert, indem sie das Bewusstsein für mentale Zustände schärft und dadurch Top-Down-Fähigkeiten der Emotionsregulation, wie die kognitive Neubewertung, unterstützt. Im Gegensatz dazu geht die Monitor-and-Acceptance-Theorie davon aus, dass Achtsamkeit das Wohlbefinden durch eine verstärkte Bottom-Up-Akzeptanz von Erfahrungen verbessert und somit den Bedarf an Top-Down-Emotionsregulation verringert. In einem kontrollierten Laborexperiment untersuchten wir die unmittelbaren affektiven Reaktionen der Teilnehmer (Valenz und Erregung) auf emotionale Stimuli in Abhängigkeit von ihrer Achtsamkeitskompetenz. Unsere Ergebnisse zeigten, dass ausgeprägte Aufmerksamkeitsfähigkeiten mit erhöhter Erregung und negativerer Valenz einhergehen, während ausgeprägte Akzeptanzfähigkeiten – insbesondere bei erfahrenen Praktikern – mit geringerer Erregung und positiverer Valenz verbunden sind. Allerdings moderierten Achtsamkeitsfähigkeiten nicht die Effekte der Top-Down-Emotionsregulation. Diese Befunde stützen die Monitor-and-Acceptance-Theorie, die postuliert, dass Achtsamkeit primär durch Akzeptanz und nicht durch die Förderung der Top-Down-Emotionsregulation zum Wohlbefinden beiträgt. Dennoch sind unsere Ergebnisse aufgrund von Limitationen, wie der begrenzten Stichprobengröße, der Abhängigkeit von Selbstauskünften und der Homogenität der Teilnehmer, vorläufig und schließen die Mindfulness-to-Meaning-Theorie nicht endgültig aus. Es ist möglich, dass beide Theorien, wie im Dynamic Model of Mindfulness vorgeschlagen, unterschiedliche, aber komplementäre Mechanismen der dynamischen Wirkungen von Achtsamkeit erklären. Unsere Studie hebt die Bedeutung von

Akzeptanzfähigkeiten für das affektive Wohlbefinden hervor, doch weitere Forschungen sind notwendig, um ein umfassenderes Verständnis dieser Zusammenhänge zu gewinnen.