Mindfulness and emotional regulation: A systematic literature review*

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Objective: This systematic literature review study sought to analyze the relationship between mindfulness and emotional regulation. Method: Several national and international databases were consulted and 60 articles published in the period from 2009 to 2019 were selected for analysis. Results: In conceptual terms, mindfulness is predominantly considered as a trait, and less as a state or skill. The results of empirical studies suggest that mindfulness is associated with the use of adaptive emotional regulation strategies favoring healthy psychic functioning. The limits and contributions of this review are also pointed out. Conclusion: It is concluded that there is a need for further studies that consider the procedural aspect of mindfulness and that make it possible to capture the subjective experience of the practice, considering the prevalence of quantitative studies that used self-report scales.

Descriptors: Mindfulness; Literature Review; Emotions; Mental Health.

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**Mindfulness e regulação emocional: uma revisão sistemática de literatura**

Objetivo: este estudo de revisão sistemática de literatura buscou analisar as relações entre mindfulness e regulação emocional. Método: foram consultadas diversas bases de dado nacionais e internacionais e selecionou-se para análise 60 artigos publicados no período de 2009 a 2019. Resultados: Em termos conceituais, mindfulness é prevalentemente considerado como um traço, e menos como um estado ou habilidade. Os resultados dos estudos empíricos sugerem que mindfulness mostra-se associado ao uso de estratégias de regulação emocional adaptativas favorecendo o funcionamento psíquico saudável. Apontam-se também os limites e contribuições desta revisão. Conclusão: Há a necessidade de mais estudos que considerem o aspecto processual de mindfulness e que possibilitem capturar a vivência subjetiva da prática, tendo em vista a prevalência de estudos quantitativos que fizeram uso de escalas de autorrelato.

Descritores: Atenção Plena; Revisão de Literatura; Emoções; Saúde Mental.

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**Mindfulness y regulación emocional: una revisión sistemática de la literatura**

Objetivo: este estudio de revisión sistemática de la literatura buscó analizar la relación entre la atención plena y la regulación emocional. Método: se consultaron varias bases de datos nacionales e internacionales y se seleccionaron para su análisis 60 artículos publicados en el período de 2009 a 2019. Resultados: en términos conceptuales, la atención plena se considera predominantemente como un rasgo, y menos como un estado o habilidad. Los resultados de los estudios empíricos sugieren que la atención plena se asocia con el uso de estrategias adaptativas de regulación emocional que favorecen el funcionamiento psíquico saludable. También se señalan los límites y las contribuciones de esta revisión. Conclusión: se concluye que es necesario realizar más estudios que consideren el aspecto procesal de la atención plena y que permitan capturar la experiencia subjetiva de la práctica, considerando la prevalencia de estudios cuantitativos que utilizaron escalas de autoinforme.

Descryptores: Atención Plena; Revisión de Literatura; Emociones; Salud Mental.
Introduction

Over the past three decades, there has been a notable growth in the scientific interest in the benefits promoted by the practice of mindfulness\(^1\). Diverse empirical evidence points out that this practice can allow people to deal with their emotions in a more adaptive manner\(^2\). Associated with mindfulness, the emotional regulation process has also been extensively investigated\(^3\), bringing out evidence that both contribute to mental health and personal well-being\(^4\).\(^5\)\(^6\)\(^7\).

The growing interest in exploring the role of mindfulness in the emotional regulation process is due to its effect in reducing the negative response to stress and in improving emotional management processes\(^8\), enhancing the effect on psychological well-being\(^9\)\(^10\). Higher levels of mindfulness have been associated with more adaptive emotional regulation processes in clinical and non-clinical populations\(^11\)\(^12\).\(^13\). However, the mechanisms of this relationship have not yet been widely understood\(^14\).\(^15\).

One of the difficulties is the operationalization of the mindfulness construct. The authors highlight three types of studies most found in the scientific literature on mindfulness: i) studies based on interventions (such as the use of the Mindfulness Based Stress reduction – MBSR program or full attention exercises), ii) comparison of mindfulness practitioners and non-practitioners, and iii) studies on the dispositional trait of mindfulness. This variability in studies is attributed to the different forms for the operationalization of mindfulness.

In the field of Psychology the term mindfulness has been used in three ways, with possible impacts on how the concept is operationalized in the empirical studies: i) characteristic or trait: stable quality that differs between the individuals, ii) momentary state: which can be induced; and iii) ability developed through the intervention: which involves learning by means of formal and informal practices. The diverse evidence on the effects of mindfulness differs depending on how it is operationalized\(^16\). There is discussion in the literature\(^17\) that some authors conceive it as a one-dimensional construct\(^18\), while others see it as multi-factorial\(^19\)\(^20\).\(^21\)\(^22\). There is also criticism on the trend to define and operate this construct as a stable trait, which departs from the definition of Buddhist texts that value its procedural and dynamic aspect\(^23\).

Taking as a base the pointed out aspects, it was decided to carry out a systematic literature review in order to identify how mindfulness has been operationalized in the empirical studies and to characterize the nature of the relationships between mindfulness and the emotional regulation process in the national and international literature over the last ten years. Systematic reviews are important methodological resources in a context of accelerated growth of the scientific production. They allow scientists to answer questions about the quality and quantity of what is being produced in a specific scientific field, assisting researchers in the critical analysis of the accrued knowledge and in the elaboration of more promising research projects by taking into account empirical evidence and theoretical bases pointed out as more consistent\(^24\)\(^25\).

It is expected that the results and the analysis carried out from this systematic review will contribute to offer a clearer picture of the operationalization and current state of the scientific production concerning the relationship between mindfulness and emotional regulation. It is also expected to contribute to the improvement of studies in this area and to offer information to subsidize intervention programs based on mindfulness.

Method

Systematic reviews are secondary studies conducted from published primary studies\(^26\). The steps to carry out a literature review are the following: definition of the research question; search for evidence (definition of terms or keywords and search strategies); selection of studies (inclusion or exclusion in view of the established criteria); evaluation of the methodological quality of the study (by reading the articles), and presentation of the results (elaboration of an abstract on the selected studies and articulation with the research question)\(^27\).

The guiding questions for this literature review were the following: “What are the empirical relationships between mindfulness and emotional regulation available in the national and international literature?” and “In what way has mindfulness been operationalized in these empirical studies?” The established time frame was from 2009 to 2019, and this period was chosen because it made it possible to analyze both more recent publications (last five years) and previous studies, broadening the understanding of the relationship between the constructs.

Initially, between November and December 2019, a search was conducted in Google Academic and in all the databases available in the CAPES (Commission for the Improvement of Higher Education Personnel) Journal Portal for scientific articles on mindfulness and emotional regulation. The search was also conducted in specific databases such as Scientific Electronic Library Online (Scielo), Latin American and Caribbean Literature
in Health Sciences (Literatura Latino-Americana e do Caribe em Ciências da Saúde, Lilacs) and the Research Gate website.

The criteria established for the selection of scientific articles were as follows: empirical articles, published from 2009 to 2019, using combinations of the keywords mindfulness, atenção plena, regulação emocional, emotional regulation and emotion regulation. The Boolean operator “and” was used so that both keywords were included in the searches. The search was limited to articles published in Portuguese, English and Spanish, whose participants have been adults. The databases were configured to search the words “título” and “assunto” in the CAPES Portal and “title” and “keywords” in Google Academic and in the other databases. Through Research Gate, access was obtained to articles whose full text was not available in the databases consulted. The exclusion criteria were removal of theses, theoretical articles, review or meta-analysis articles, editorials, comments on articles, books and book chapters.

A total of 762 articles were found in the CAPES Journal Portal databases, 350 documents in Google Academic, one article in Scielo, one article in Research Gate and no article in Lilacs, totaling 1,114 documents. From the reading of the title, the first selection of articles that met the inclusion criteria was started. In cases where the title, abstract or keywords were not sufficient to decide on the inclusion of the article, the entire study was read. Duplicate documents were also excluded. At the end of this first stage, 283 texts were selected, 236 identified in the databases available in the CAPES journal platform, 45 in Google Academic, one in Scielo and one in Research Gate. The second and last stage of the selection of empirical articles was made by reading the abstracts of these articles. The established inclusion criteria were taken into account, excluding those articles that made reference to very specific subject matters, which would hinder drawing general conclusions from relations between mindfulness and emotional regulation. Therefore, very specific articles on psychopathologies, training focused on compassion or on the cognitive aspect, chronic pain, decision-making processes, target population of children, adolescents and older adults, among others, were removed from the final list of articles. There were 60 articles left for analysis, 45 in the CAPES portal, 14 in Google Academic, and one in Research Gate.

The databases and the respective number of articles identified for reading were as follows: Springer (n=19), Elsevier (n=18), PubMed (n=9), Routledge (n=4), American Psychological Association (n=3), Ebsco (n=2), Semantic Scholar (n=2), Wiley Periodicals (n=2) and Australian Psychological Society (n=1).

The selected articles were read in full and a synthesis of the main information, such as year, authorship, study objective and conclusions, was carried out. From reading the texts, a categorization was made regarding the operationalization of mindfulness using the direct information of the text or from the way in which the author treated the construct (trait, state or ability). In addition, the studies were categorized according to their objective, through analysis of the thematic content where the studies were grouped by thematic similarity or proximity, since the data analysis of a literature review must observe patterns and carry out comparisons among the studies, grouping them into analytical categories. The categories were elaborated in an inductive manner, after reading the articles selected by the first author and orientation by the second author. These categories were created trying to answer the questions of this literature review.

Results

Initially, the general characteristics of the reviewed studies will be described and, later, an analysis of their objectives and main results will be presented. It is noted that most publications occurred in the last five years (2015 to 2019), with 37 publications in this period (61.6%) and 23 between 2009 and 2014 (38.4%).

The reviewed studies were conducted in several countries: United States of America (n=15), China (n=4), Germany (n=2), Iran (n=2), Israel (n=1), Japan (n=1), South Korea (n=1), Singapore (n=1), Switzerland (n=2), Sweden (n=1), United Kingdom (n=1), Brazil (n=1). The study locus was not mentioned in 23 studies.

In relation to the participants, there was a prevalence of division into two groups, with 26 studies being conducted with adult individuals from the general population and 26 with students. Five studies had a clinical sample (individuals under treatment or seeking treatment for anxiety and depression disorders) and three merged clinical and non-clinical participants.

Regarding the operationalization of mindfulness, in 38 studies mindfulness was defined as a trait (stable individual characteristic), in eight as a state (momentary state induced during data collection), and in nine as an ability (developed through an intervention program based on mindfulness or brief training). Three studies addressed mindfulness both as a state and as a trait and two treated it as a state and as an ability, as described in Figure 1.
### Mindfulness

<table>
<thead>
<tr>
<th>Definition</th>
<th>Examples</th>
<th>Studies (author/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trait</strong></td>
<td>Stable characteristic that differs among the individuals</td>
<td>Peixoto LSA, Gondim SMG.</td>
</tr>
<tr>
<td><strong>Dispositional</strong></td>
<td>Self-reporting scales were applied for mindfulness, difficulty of emotional regulation and psychic abilities of emotional regulation and attachment would be related to dispositional mindfulness</td>
<td>Ng, 2019; Cho et al., 2017; Coffey et al., 2010; Cosme and Wiens, 2015; Curtiss et al., 2016; Despres et al., 2013; Despres et al., 2014; Duber et al., 2012; Harni et al., 2018; Hennes et al., 2015; Hill and Udden, 2012; Jannati et al., 2015; Kaiser et al., 2013; Kobus et al., 2015; Mahmoodzadeh et al., 2015; Manev et al., 2017; Maqbool et al., 2014; Parmentier et al., 2017; Rauh and Fink, 2015; Ramus, 2013; Ramus et al., 2016; Roemer et al., 2008; Ross et al., 2010; Prakash et al., 2017; Quiggin et al., 2017; Remmers et al., 2015; Serpa et al., 2014; Sharpley and Alexander, 2016; Shafiee-Tabar, 2017; Shafiee-Tabar and Shermahini, 2017; Tong and Keng, 2017; Zhang et al., 2019.</td>
</tr>
<tr>
<td><strong>State and trait</strong></td>
<td>The neural activity involved in the emotional processing associated with mindfulness (state) and trait was investigated. For this, the participants passively remained in a state of mindfulness (trait) and, at the time of the experiment (visualization of images), the participants were asked to remain in a state of mindfulness (state).</td>
<td>Doll et al., 2016; Garland et al., 2015; Greenberg and Malman, 2014; Hoetl et al., 2017.</td>
</tr>
<tr>
<td><strong>State and ability</strong></td>
<td>The relations between mindfulness and the use of cognitive reappraisal were examined. For this, the participants passively remained in a state of mindfulness (ability), the participants did a 10-minute meditation exercise of mindfulness (ability) and, at the time of the experiment (visualization of images), they were asked to remain in a state of mindfulness (state).</td>
<td>Garland et al., 2014; Goodall et al., 2012; Hill and Updegraff, 2012; Iani et al., 2019; Kaiser et al., 2015; Kotsou et al., 2015; KRAL et al., 2018; Robins et al., 2012; Snippe et al., 2017; Xiao et al., 2019.</td>
</tr>
</tbody>
</table>

**Figure 1** - Operationalization of mindfulness in the selected articles.
Among the most commonly used instruments to measure the constructs under analysis, the use of self-reporting scales was predominant. On mindfulness, the Five-Facet Mindfulness Questionnaire (FFMQ21; n = 25) and Mindful Attention Awareness Scale (MAAS20; n = 19) were prevalent and, in relation to the measurements of emotional regulation, the Difficulties in Emotion Regulation Scale (DERS29; n = 16), Positive and Negative Affect Schedule (PANAS37; n = 15) and Emotional Regulation Questionnaire (ERQ38; n = 14) stood out.

As for the studies, they were organized in five categories (Figures 2 to 5) by similarity related to the research focus. Most of the studies (n = 19) sought to identify the effects of mindfulness and of emotional regulation strategies on the emotional response and on the regulation of emotions (Figure 2). The most specific focus of the desired relationship was: i) mindfulness and specific strategies, example: cognitive reevaluation and rumination (n = 5); ii) mindfulness and the response and involvement of the individuals with emotional stimuli (n = 3); iii) mindfulness and the capacity for emotional differentiation in the regulation of emotions (n = 3); iv) the effects of a program based on mindfulness on the emotional experience (n = 3); and v) how the dimensions of these constructs interrelate and impact on improvements in health and well-being (n = 3). In summary, the results of these studies indicate positive effects of mindfulness on the emotional regulation process (more adaptive, more flexible, greater use of reevaluation, fewer negative thoughts, less stress), with repercussions on health and on well-being4,7,31,34,39-45.

Contrary to the strong assumption that mindfulness practitioners would be less affected by emotional stimuli, in one of the studies, experienced practitioners had high emotional engagement with the tasks proposed when compared to non-practitioners, as well as faster recovery than the latter52. The emotional stimulus was induced from the presentation of films, after which the response time was measured in the recall of a memory with emotional content opposite to that induced (e.g., sad movie – happy memory). In another study, it was proposed to investigate reactivity and emotional recovery to affective stimuli and it was identified that individuals who presented higher mindfulness scores had a rapid recovery after negative stimuli induced by images with affective content, but without decreased reactivity (measured by the subjective evaluation of the images)46.

Positive associations were identified between mindfulness and the ability to differentiate emotions. Higher mindfulness scores were shown to be associated with greater capacity for emotional differentiation and less emotional difficulty (self-reported emotional deregulation and less emotional lability)47. The ability to differentiate negative emotions was associated with higher mindfulness scores, with repercussions on the adaptive response to stress48. Another study goes on to investigate if, in addition to emotional differentiation, the ability to differentiate context assessment (interpretation of reality) would be a mediator of the relationship between mindfulness and the capacity for emotional differentiation49. The results suggest that individuals with lower mindfulness scores experience undifferentiated emotional states not only because of the inability to regulate emotions, but also because of their interpretation of the world (different and competing evaluations), therefore with emphasis also on the cognitive aspect.

In addition, some studies investigated dimensions of mindfulness in association with emotional regulation strategies. The “describe” and “non-reactivity” dimensions were associated with greater use of reevaluation and acceptance and with lesser use regarding suppression of emotions; observation with more rumination; and non-judgment with less rumination50. In another study it was identified that some factors associated with mindfulness (description, acting consciously) predict less reactivity to stress and anguish12. There was also a discussion on the overlapping of mindfulness and emotional regulation, considering their factors and emphasizing the mediators: clarity, managing negative emotions, detachment and rumination in the relationship between mindfulness and mental health11.

The studies that included other constructs to deepen the understanding of the relationship between mindfulness and emotional regulation (n = 15), presented in Figure 3, make reference to affects (n = 4), mood (n = 3), behavior motivation (n = 2), work memory (n = 2), attachment (n = 2), self-efficacy (n = 1) and social connection (n = 1). The results provide evidence of positive effects of mindfulness on affects, mood, memory and social connection3,10,51-57. Another result indicates that affect and self-efficacy would mediate the relationship between mindfulness and emotional regulation, with positive effects on satisfaction with life10.58. Additionally, mindfulness, emotional regulation and attachment would be correlated29,59. Finally, the studies indicate that mindfulness relates to the behavior inhibition system, which provides for greater vigilance with behavior inhibition, and problems with psychic functioning (anxiety). That is, individuals who are more sensitive to the behavioral inhibition system have more difficulty in regulating emotions, partly because they have difficulties in using important dimensions of mindfulness, such as to acting consciously, not judging and not being reactive60, and that acceptance and the facets of mindfulness (observation and non-reactivity) would cushion the influence of the behavioral inhibition system on psychological suffering61.
<table>
<thead>
<tr>
<th>Authorship/ Year</th>
<th>Objective</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Igna and Stefan, 2015</td>
<td>To compare mindfulness, cognitive revaluation, images and rational statements, emotional response (negative emotions and suffering) and negative automatic thoughts</td>
<td>Significant difference between cognitive revaluation and irrational and quasi-significant statement between mindfulness and irrational statement. These strategies are protective factors for stress perception</td>
</tr>
<tr>
<td>Prakash et al., 2017</td>
<td>To investigate whether emotional regulation strategies support the association between mindfulness and emotional deregulation (comparing different age groups)</td>
<td>Less avoidance of thoughts partially explains the relationship between mindfulness and better emotional regulation, with stronger mediation for young people</td>
</tr>
<tr>
<td>Garland et al., 2017</td>
<td>To examine relationships between mindfulness and positive reevaluation in a sample that participated in a mindfulness-based intervention</td>
<td>Intervention: &gt; mindfulness and &gt; use of positive reevaluation</td>
</tr>
<tr>
<td>Garland et al., 2015</td>
<td>To investigate whether the state and practice of mindfulness could improve cognitive revaluation.</td>
<td>The degree of mindfulness predicted increases in cognitive reevaluation over time</td>
</tr>
<tr>
<td>Lalot et al., 2014</td>
<td>To investigate the effects of mindfulness, reevaluation and suppression in the regulation of positive emotions (viewing videos with emotional content), observing the individuals' facial expression</td>
<td>Mindfulness and reevaluation: they reported less positive affect compared to suppression in the evaluation of the films and the variation in the facial expression was according to the strategy used. Mindfulness: decreased evaluative judgment.</td>
</tr>
<tr>
<td>Kiken and Shook, 2014</td>
<td>To investigate whether mindfulness is differentially associated with thoughts that emphasize positive or negative values</td>
<td>Mindfulness was inversely associated with rumination. The mindfulness condition had fewer negative thoughts. The conditions did not differ in the positive thoughts</td>
</tr>
<tr>
<td>Sauer and Baer, 2009</td>
<td>To explore two ways of responding to negative thoughts and emotions (approach based on change or acceptance) and assess their relationship with psychological functioning</td>
<td>Acceptance-based strategies (emotional awareness, clarity, acceptance, impulse control) were associated with lower levels of symptoms and greater well-being</td>
</tr>
<tr>
<td>Arch and Craske, 2010</td>
<td>To investigate the relationship of mindfulness with the response to a laboratory stressor in anxious and non-anxious samples</td>
<td>Mindfulness was associated with decreased responses to laboratory stressors in clinically anxious and non-anxious samples</td>
</tr>
<tr>
<td>Greenberg and Meiran, 2014</td>
<td>To investigate the relationship between the practice of mindfulness and the degree of involvement with the emotional experience</td>
<td>Mindfulness: associated with increased emotional involvement, increased contact with emotions, and rapid recovery from the emotional experience</td>
</tr>
<tr>
<td>Cho et al., 2017</td>
<td>To investigate the role of dispositional mindfulness in reactivity and subsequent recovery from negative emotions</td>
<td>Mindfulness: better recovery, but not reduced reactivity (more effective disengagement from previous stimuli)</td>
</tr>
<tr>
<td>Tong and Keng, 2017</td>
<td>To test the mediating role of emotional regulation and of the evaluation in the relationship between dispositional mindfulness and negative differentiation of the emotions</td>
<td>Maladaptive emotional regulation and assessment differentiation mediated the relationship between mindfulness and emotional differentiation</td>
</tr>
<tr>
<td>Hill and Updegraff, 2012</td>
<td>To assess the relationship between mindfulness, emotional differentiation, emotional lability, and emotional difficulties</td>
<td>Mindfulness: &gt; emotional differentiation and &lt; emotional difficulties. Mindfulness and lability mediated by emotional differentiation</td>
</tr>
<tr>
<td>Fogarty et al., 2015</td>
<td>To investigate the links between mindfulness and recovery from a negative experience and whether this is associated with greater emotional differentiation</td>
<td>Emotional differentiation associated with mindfulness facilitates a more adaptive response to stress and contributes to mental and physical health. Mindfulness as a predictor of the ER (Emotional Regulation) process</td>
</tr>
<tr>
<td>Robins et al., 2012</td>
<td>To investigate the effects of a program based on mindfulness on the daily experience of mindfulness and on aspects of the emotional experience and emotional regulation</td>
<td>Mindfulness (intervention) can increase awareness in everyday life and have a beneficial impact on clinically relevant emotion regulation processes</td>
</tr>
<tr>
<td>Erisman and Roemer, 2010</td>
<td>To examine the effects of a mindfulness intervention on emotional experiences and on regulation in response to stimuli with emotional content</td>
<td>Mindfulness: positive effect &gt; in response to positive stimulus; more adaptive regulation in response to mixed stimulus and less negative effect immediately after stimulus, but not after a recovery period.</td>
</tr>
<tr>
<td>Alkoby et al., 2018</td>
<td>To test the hypothesis that the intervention with mindfulness increases the ability of the individuals to flexibly choose among ER strategies that are more adapted to the context</td>
<td>The regulatory choice patterns of those who received the intervention were more flexible: more cognitive reevaluation with low intensity stimuli and distraction with high intensity stimuli</td>
</tr>
<tr>
<td>Iani et al., 2019</td>
<td>To explore the relationship between mindfulness and emotional regulation at the level of dimensions, in order to understand how mindfulness can improve the emotional regulation processes</td>
<td>Describe/non-reactivity + reevaluation and acceptance; Describe and non-reactivity – suppression of emotional experience, and + suppression of emotional experience, respectively; and Observe + rumination and not judging – rumination</td>
</tr>
<tr>
<td>Bullis et al., 2014</td>
<td>To explore the effect of mindfulness on emotional regulation, as well as whether specific factors of dispositional mindfulness are associated with subjective and autonomous reactivity to stress</td>
<td>Mindfulness and the description factor attenuated the reactivity of the heart rate. Acting consciously predicted less anxiety. Observing predicted more panic symptoms and greater intensity of symptoms</td>
</tr>
<tr>
<td>Coffey et al., 2010</td>
<td>To explore mindfulness and its dimensions and interactions with emotional regulation, in addition to their influence on mental health</td>
<td>Measure mindfulness and emotional regulation evaluate the constructs in an overlapping manner. Emphasis on the mediators (clarity, managing negative emotions, detachment, rumination) in relation to mental health</td>
</tr>
</tbody>
</table>

Figure 2 - Effects of mindfulness and emotional regulation strategies in the emotional regulation process (n=19)
In turn, in the studies where the relationships between mindfulness, emotional regulation and psychic functioning (n=14) were evaluated, shown in Figure 4, it is observed that, in seven of them, psychological distress or dysfunctions such as anxiety and depression were emphasized. In five, focus was given to well-being and mental health and, in one article, both dysfunctions and health and well-being were investigated.

Among the results of these studies, we highlight the findings that emotional regulation would function as a mediator in the relationship between mindfulness and dysfunctions or mental health\(^{[13-14,17,62-64]}\) with the exception of a study that proposed a model where emotional regulation would facilitate mindfulness, with consequences for health and well-being\(^{[65]}\). It is also noted that mindfulness and emotional regulation would be predictors of healthy psychic functioning\(^{[66-68]}\) and problematization if non-reactivity, acceptance, non-judgment and acting consciously would be relevant in the relationship between mindfulness, emotional regulation and psychic functioning\(^{[69-72]}\).

<table>
<thead>
<tr>
<th>Authorship/Year</th>
<th>Objective</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>McLaughlin et al., 2019</td>
<td>To investigate the indirect effect of mindfulness in &lt; difficulty of emotional regulation due to the effect of positive affect</td>
<td>Direct effect of mindfulness in the deregulation of emotion and indirect effect of mindfulness in &lt; emotional regulation problems via &gt; positive affect</td>
</tr>
<tr>
<td>LeBlanc et al., 2019</td>
<td>To investigate the relationship between reevaluation, mindfulness and satisfaction, with the hypothesis that positive affect mediates this relationship</td>
<td>Positive affect mediates this relationship. Regulating emotions in an adaptive manner (reevaluation and mindfulness) &gt; positive affect, which leads to satisfaction with life</td>
</tr>
<tr>
<td>Snippe et al., 2017</td>
<td>To examine how a change in perceived stress, negative affect and dissociation between perceived stress and negative affect evolved in the mindfulness-based intervention</td>
<td>The intervention in mindfulness reduces negative affect and stress perception. The results suggest that there is a relationship between the amount of mindfulness practice and reductions in daily stress and negative affect</td>
</tr>
<tr>
<td>Brockman et al., 2017</td>
<td>To examine the influence of three emotional regulation strategies (full attention, cognitive reevaluation and suppression) in the daily experience of negative and positive affects</td>
<td>Daily practice of mindfulness: &lt; negative affect and &gt; positive affect, while the reverse pattern was found for the suppression of emotions. Cognitive reevaluation is associated with positive, but not negative, affect.</td>
</tr>
<tr>
<td>Zhang et al., 2019</td>
<td>To examine the effects on the participants’ mood in an 8-week program, comparing focused attention meditation (FAM) and open monitoring meditation (OMM)</td>
<td>Intervention in mindfulness and emotional states. FAM Meditation: &gt; partially mindfulness and &gt; mood. OMM Meditation: &gt; mindfulness and maintenance of positive mood</td>
</tr>
<tr>
<td>Keng et al., 2013</td>
<td>To investigate mindfulness and reevaluation in &lt; sad mood and whether mindfulness and the usual reevaluation moderate the effects. To compare investment in the cognitive resources</td>
<td>Mindfulness and reevaluation are equally effective in regulating sad mood, but incur in different levels of cognitive costs (reevaluation requires greater cognitive effort)</td>
</tr>
<tr>
<td>Remmers et al., 2016</td>
<td>To investigate whether mindfulness improves implicit negative mood and explicit mood</td>
<td>Mindfulness can facilitate emotional regulation at implicit and explicit levels. The mindfulness group exhibited greater congruence between implicit and explicit mood</td>
</tr>
<tr>
<td>Hamill et al., 2015</td>
<td>To examine whether the following adaptive ER strategies: mindfulness and acceptance, moderate the relationship: sensitivity of the Behavioral Inhibition System and psychological distress</td>
<td>Association between the sensitivity of the Behavioral Inhibition System and psychological suffering with acceptance and facets of mindfulness (non-reactivity and observation) moderating this association</td>
</tr>
<tr>
<td>Reese et al., 2015</td>
<td>To examine the relationships between behavioral motivation systems and emotional deregulation, mediated by facets of mindfulness</td>
<td>Indirect relationship: sensitivity of the behavior inhibition system and &gt; emotional deregulation via the underutilization of 3 dimensions of mindfulness: acting consciously, not judging and not reacting</td>
</tr>
<tr>
<td>Kaiser et al., 2015</td>
<td>To investigate the relationship between rumination, decentralization (mindfulness) and work memory after exposure to interpersonal criticism</td>
<td>Ruminative: &lt; cleaning of irrelevant information in negative emotional conditions. Decentralization: better work memory after criticism</td>
</tr>
<tr>
<td>Dubert et al., 2016</td>
<td>To examine the relationship between mindfulness and emotional regulation and the potential mediating role of the operational memory capacity in this relationship</td>
<td>Mindfulness can influence the work memory capacity and the ability to regulate emotions. The work memory capacity does not explain how mindfulness influenced the use of reevaluation</td>
</tr>
<tr>
<td>Goodall et al., 2012</td>
<td>To investigate the relationship between mindfulness, secure attachment and emotional regulation</td>
<td>The emotional regulation capacity plays a greater role in dispositional mindfulness than the attachment style. The results also indicated conceptual overlapping between mindfulness and emotion regulation (awareness and acceptance of the emotional response)</td>
</tr>
<tr>
<td>Pepping et al., 2013</td>
<td>To understand the relationship between attachment and mindfulness is mediated by difficulties in emotional regulation</td>
<td>Difficulties in emotion regulation mediated the association between anxious attachment and mindfulness, and between avoidance attachment and mindfulness</td>
</tr>
<tr>
<td>Luberto et al., 2014</td>
<td>To examine the self-efficacy of coping as a mediator for the relationship between mindfulness dimensions and ER difficulties</td>
<td>Coping self-efficacy partially explains the relationships between mindfulness and ER difficulties. &gt; describe, acting consciously and not judging: &gt; self-efficacy that partially mediated the relationship between these dimensions and difficulties in emotional regulation (indirect effect)</td>
</tr>
<tr>
<td>Quaglia et al., 2015</td>
<td>To identify the mechanisms through which the individual differences in mindfulness would provide for adaptive social emotional regulation and, in turn, enhance social connection</td>
<td>Mindfulness related to more efficient top-down attention to emotional facial expressions, which is related to the improved regulation of social emotions in daily life</td>
</tr>
</tbody>
</table>
In the studies where neurobiological factors involved in the practice of mindfulness (n=10) were addressed, gathered in Figure 5, specific regions of the brain were investigated, such as amygdala and frontal cortex (n=3), as well as the brain effects of mindfulness-based techniques or interventions (n=3), the brain effects of different emotional regulation strategies (n=3), affective reactivity to emotional stimuli (n=1) and neural mechanisms of generalized anxiety (n=1).

The results achieved with its performance indicated changes in the brain regions and neural mechanisms involved in emotional processing (amygdala and prefrontal cortex) with optimization of the emotional regulation process[33,35,73-79]. One study tested the moderating effect of mindfulness in the response to emotional stimuli (images with emotional content), assuming that the reactivity to stimuli would be lower, since mindfulness facilitates a receptive and non-reactive posture to external and internal stimuli[18]. However, this study found no empirical evidence that dispositional mindfulness moderates the individual reaction (assessed with physiological and psychological measures) to emotional stimuli.

Finally, in the two studies where comparisons of meditation modalities and/or stress control techniques were made, associations were found between mindfulness meditation and the twin hearts meditation* (n=1); and between mindfulness, passive progressive muscle relaxation,** and loving-kindness meditation*** (n=1). The results indicated that mindfulness-based meditation favors a posture of greater decentralization (a more detached way of relating to one’s thoughts) than other techniques[80]. In a study, however, it was pointed out that the twin hearts meditation was more effective for the emergence of positive affects than mindfulness-based meditation[81]. It is important to consider the objectives of each type of meditation in order to understand the scope of these results. The twin hearts and loving-kindness meditations induce positive emotions through directing them to the entire humanity, and the progressive muscle relaxation directs the focus of attention towards relaxing the body. The practices of mindfulness, in their turn, only suggest that the individual perceives the emotions and sensations found in the body, regardless of what they are. Therefore, the results of each type of meditation are consistent with the objectives they are proposed for, as seen in the results: mindfulness promoting greater decentralization than loving-kindness meditation and progressive muscle relaxation, while the twin hearts meditation promotes more positive emotions than mindfulness.

<table>
<thead>
<tr>
<th>Authorship/Year</th>
<th>Objective</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freudenthaler et al., 2017</td>
<td>To investigate whether emotional regulation mediated the positive effects of mindfulness on depression and anxiety symptoms in the general population</td>
<td>&gt; mindfulness: better emotional regulation, associated with &lt; depression and anxiety (ER partially mediated the associations of mindfulness with depression and anxiety)</td>
</tr>
<tr>
<td>Ostafin et al., 2014</td>
<td>To examine whether affective reactivity mediates the relationship between mindfulness and anxiety</td>
<td>Inverse relationship between mindfulness and chronic anxiety, partially mediated by affective reactivity</td>
</tr>
<tr>
<td>Kotsou et al., 2018</td>
<td>To compare the capacity of emotional competence, emotional regulation, acceptance, and mindfulness in predicting the severity of disorders and well-being</td>
<td>The four predictors correlated with psychopathology - anxiety, depression, stress - and positively with happiness. Importance of acceptance in understanding emotional disorders</td>
</tr>
<tr>
<td>Mittansgruber et al., 2002</td>
<td>To explore the role of avoiding the experience, meta-emotions and mindfulness on the prediction of well-being</td>
<td>Meta-emotions exert a powerful influence on well-being beyond avoiding the experience and mindfulness</td>
</tr>
<tr>
<td>Desrosiers et al., 2013</td>
<td>To investigate the mechanisms of emotional regulation through which mindfulness is related to mental health</td>
<td>Mindfulness operates with different and common mechanisms, depending on the clinical context. Rumination and worry mediate mindfulness and anxiety. Rumination and reevaluation mediate mindfulness and depression</td>
</tr>
<tr>
<td>MacDonald and Baxter, 2017</td>
<td>To examine emotional regulation and suppression as mediators of the association between mindfulness components and well-being</td>
<td>&gt; mindfulness: &gt; emotional awareness and control, &gt; ability to tolerate negative thoughts, which can &gt; psychological health</td>
</tr>
<tr>
<td>Mahmoudzadeh et al., 2015</td>
<td>To investigate the relationship between psychological well-being and mindfulness and emotional regulation strategies, and to identify which one better predicts psychological well-being</td>
<td>Mindfulness and well-being are + correlated with the more adaptive cognitive ER strategies and - correlated with the less adaptive.</td>
</tr>
</tbody>
</table>

Figure 4 - Mindfulness, emotional regulation and psychic functioning (n=14)

* The Twin Hearts meditation was created by Grandmaster Choa Kok Sui and consists of visualizing planet Earth and directing positive emotions to the entire humanity.
** Passive progressive muscle relaxation is a technique where the individuals are guided to perceive sensations of tension in each part of the body and then allow these muscles to relax completely
*** The loving-kindness meditation is based on the Buddhist tradition and consists of creating feelings of social connection and compassion for oneself and for others, through the repetition of phrases like: “I live in safety, I live happily” and gradually extend this to significant others and unknown people: “May you live safely, may you live happily”
Discussion

This review sought to answer two questions: (i) identify how mindfulness has been operationalized in empirical studies, and (ii) characterize the nature of the relationships between mindfulness and the emotional regulation process in the national and international literature over the last ten years. In relation to the first question, we observed the presence of three main operationalizations of mindfulness in the researched studies: trait, state and ability. This discussion exists in the literature\textsuperscript{[18,82]}, where it is emphasized that the way in which mindfulness is operationalized is crucial to the investigative process of this construct. These authors point out that there are different ways to investigate the mindfulness construct, considering it as a trait or characteristic that varies among the individuals, as a temporary state that can be induced and manipulated in the laboratory for a short period of time, and also as an ability that can be developed through mindfulness-based interventions\textsuperscript{[83]}. In this review, there was predominance of the conception of mindfulness as a trait, followed by as an ability and, finally, as a temporary state.

The operationalization of the construct is linked to a conception of mindfulness and to the way it is measured. Some studies have found evidence of the relationship between mindfulness treated as a state or as an ability to decrease reactivity to emotional stimuli\textsuperscript{[18]}. On the other hand, there are inconclusive results when mindfulness is treated as a trait. In some studies included in this review, for example, dispositional mindfulness was not associated with reduced affective reactivity during the visualization of emotional stimuli\textsuperscript{[18,40]}. In the studies of this review, there was also no evidence on the use of qualitative methodologies to learn the subjective aspect of the mindfulness experience, but the frequent use of scales to measure this construct. Despite the scientific value of self-reporting measures that provide information on the individuals’ self-perception, there is the problem of social desirability and inaccuracy in the response due to the individuals’ lack of full knowledge on their own states and behaviors\textsuperscript{[23]}. In case of the scales, there can be lack of understanding of the items, resulting in different interpretations of their meanings for the researcher and the participants\textsuperscript{[83]} or even among
participants with different levels of familiarity with the concept\textsuperscript{[19,23]}. Western people are relatively inexperienced with the concept and experience of \textit{mindfulness}, which impacts on the understanding of the formulated items\textsuperscript{[22]}. On the other hand, in defense of the \textit{mindfulness} scales, several studies have identified their good psychometric properties measured by internal consistency and predictive validity\textsuperscript{[19]}, and predictive power of psychological problems\textsuperscript{[20]}, also pointing out positive correlations between high scores and practice time\textsuperscript{[21]} and higher scores after the intervention\textsuperscript{[20]}.

Thus, it becomes relevant to consider the operationalization of the concept, since the two most cited measures in this review for assessing \textit{mindfulness} have different factorial structures. The MAAS scale\textsuperscript{[20]} has a one-dimensional structure to measure the awareness of the moment in the everyday experiences, whereas FFMQ\textsuperscript{[22]} is multi-dimensional (five factors), consisting of observing, describing, not judging the inner experience, acting consciously, and not being reactive to the inner experience.

This variability in the operationalization of \textit{mindfulness} can represent an obstacle to understanding the construct\textsuperscript{[19,22]} and to conducting research studies that may come to bring out robust evidence about its effectiveness for the mental health of the individuals, as the measures may be evaluating different aspects, even with overlaps in relation to other constructs such as emotional regulation.

In a study presented in this review, the hypothesis of overlap between the \textit{mindfulness} factors and the concept of emotional regulation was corroborated\textsuperscript{[30]}, even if they are different processes\textsuperscript{[1]}. In examining these overlaps, the authors identified that there are some common factors, namely: "acceptance of the internal experience", "recognition of the internal experience" and "behavior in the presence of unpleasant internal experiences". On the other hand, the \textit{mindfulness} factors of "attention in the present" and "acting consciously" were identified as specific to \textit{mindfulness}, without overlapping with emotional regulation factors. Finally, in this study it was also revealed that the constructs under analysis can contribute or facilitate the expression of each other.

Seeking to respond to the existing interactions between \textit{mindfulness} and emotional regulation, the analysis of the reviewed studies reasserted the conception found in the literature that \textit{mindfulness} and emotional regulation are constructs associated with psychic functioning and mental health, and that they seek to understand the mechanisms that are at the basis of these relationships. In addition, some research studies included their interaction with other constructs of Psychology, such as affects, mood, self-efficacy, and social connection. The studies also included a neurobiological approach to identify brain changes through the practice of \textit{mindfulness}.

The analyzed constructs may come to contribute to or facilitate the expression of each other\textsuperscript{[19]}, which was also pointed out by other reviewed studies\textsuperscript{[65]}. The view that the relationship between emotional regulation and \textit{mindfulness} is considered pertinent can be bidirectional\textsuperscript{[29]}, and that \textit{mindfulness}-based interventions can provide better emotional regulation, while individuals with adaptive emotional regulation strategies have higher levels of \textit{mindfulness}.

There is great variety in the literature regarding the interactions between \textit{mindfulness} and emotional regulation, with studies where relations of mediation, moderation, prediction, associations or correlations are indicated. Furthermore, in the selected articles there was no consensus that \textit{mindfulness} would be considered an emotional regulation strategy, as only six of the analyzed studies conceptualize \textit{mindfulness} in such a way.

There is still the view that \textit{mindfulness} is not just a specific emotional regulation strategy\textsuperscript{[31]}. \textit{Mindfulness} plays a broader role in the processes of emotional regulation, affecting the most central regulatory stages. This view is shared in review\textsuperscript{[2,5]} and theoretical\textsuperscript{[85]} articles. \textit{Mindfulness} can promote flexibility in the cognitive evaluation by increasing interoceptive attention, which impacts on the process of emotional regulation\textsuperscript{[40]}.

Thus, understanding the relationship between \textit{mindfulness} and emotional regulation in empirical studies requires returning to these concepts and to their operationalization, as well as investing in scientific efforts for a clearer and more precise delineation of the possible connections between these constructs that have been shown to be essential for the mental health and psychic functioning of the individuals.

\textbf{Conclusion}

This literature review provides an overview of the existing discussions in the scientific field about the relationship between \textit{mindfulness} and emotional regulation, in addition to discussing operational aspects related to the conception of \textit{mindfulness}. Regarding the operationalization of \textit{mindfulness}, the following is observed: predominance in the studies that treat it as a trait, the use of self-reporting measures, and
the prevalence of quantitative analyses. Studies with a qualitative approach, which allow for a better understanding of the subjective experience, were not identified in the sample of this review. Some authors also argue about the overlapping of factors of the mindfulness constructs and emotional regulation, which hinders conceptualizing and understanding their relationships, in addition to the lack of consensus regarding the factors that make up mindfulness.

The review showed that, in fact, mindfulness and emotional regulation are interrelated. In the studies analyzed, it was observed that mindfulness has repercussions in the process for choosing emotional strategies by (i) facilitating the use of more adaptive strategies such as cognitive reevaluation; (ii) reducing the use of dysfunctional strategies such as rumination and suppression; and (iii) giving more flexibility in the choice of strategies since the individual is more present and receptive to the demands of the context. Additionally, mindfulness would be related to the process of effective emotional regulation, as it would promote (i) good capacity for emotional differentiation; (ii) rapid emotional recovery after negative stimuli; and (iii) high emotional engagement with emotional stimuli. In addition, it is worth noting that the results of the studies were inconclusive in relation to the investigation of the relationships between emotional reactivity, mindfulness, and the emotional regulation process.

Emotional regulation was also characterized as an important mediator in the relationship between mindfulness and mental health, although there are other models that conceive mindfulness as the mediator of the relationship between emotional regulation and mental health. There was also a discussion that mindfulness and emotional regulation are predictors of mental health and that the dimensions of mindfulness are related to the emotional regulation process and to mental health, favoring it, with the exception of the observation dimension that, in isolation, is associated with higher anxiety levels.

It was verified that the relationship between mindfulness and emotional regulation contributes with positive effects on other constructs such as affects, mood, memory, and social connection; in addition to being related to concepts such as self-efficacy and attachment. And, finally, that mindfulness contributes to changes in the brain regions and neural mechanisms involved in optimizing the process for regulating the emotions.

It was thus identified that there are positive repercussions of high levels of mindfulness and adaptive emotional regulation strategies with healthy psychic functioning, but the mechanisms underlying this process require more research. Another aspect is that the conceptual imprecision and the measures used to evaluate these constructs make it difficult to identify the relationships between them, often indicating overlap. The studies have advanced in the investigation of constructs and an important aspect they highlighted is the need to explore the processes of emotional regulation in the intervention programs, given the connection between mindfulness and the regulation of the emotions for psychological well-being.

In most of the studies identified in this review, a cross-sectional methodology was used, which limits conclusions about causality or temporal precedence. Thus, an observed gap was the need for more longitudinal studies. In addition, we highlight the use of other measures (physiological, for example) and strict control conditions (control group) to determine the specificity of the effects of mindfulness, thus indicating a need for further experimental and intervention studies.

However, there are some clear limitations in this review because, even though a consultation was carried out in various databases, some journals relevant to the area may not have been contemplated. Another methodological weakness of this study is that the selection of articles and data analysis was performed by only one researcher, without validation by an external judge or group of independent reviewers. It was also decided to delimit the review to empirical studies, excluding review and meta-analysis studies that could have added relevant information for understanding the relationship between mindfulness and the emotional regulation process. Although some review studies have been consulted, they have not been consulted in a systematic way, as was the case with empirical studies.

It is therefore concluded that future research studies must consider and explain the conceptual and operational aspects of mindfulness and emotional regulation for creating greater conceptual clarity since, in this review, it was verified that this is an aspect that needs better understanding. The results indicated in this literature review can contribute to a better understanding of the advances in the scientific field that relates mindfulness with emotional regulation processes, since these constructs have an impact on the healthy psychic functioning of the individuals.

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All authors approved the final version of the text.

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