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RESEARCH ARTICLE

Access to autobiographical memory as an emotion regulation strategy and its relation to dispositional mindfulness

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Abstract Mindfulness research has extensively focused on mechanisms that make it work. Emotional regulation (ER) has been proposed as one of the mechanisms to explain the effects of mindfulness on health. ER is composed of a broad set of strategies, such as the use of autobiographical memory (AM), which refers to the recollection of personally experienced past events to regulate the emotion (i.e., remembering a positive past event in order to calm anxiety). Authors suggest that mindfulness and AM are related. However, few studies exist to explore this relationship that could promote a more adaptive ER. The aim of this study is to explore the relationship between the mindfulness trait and the use of positive specific memories (as an ER strategy) after sadness induction. The sample was composed of 60 university students with no mindfulness meditation experience. Participants completed the Beck Depression Inventory Questionnaire (BDI-II), the Five Facets of Mindfulness Questionnaire (FFMQ), and the Visual Analog Scale (VAS). A sad Mood Induction Task (MIT) was applied to the participants using Virtual Reality (VR) before the AM task. Results showed that the *Non-reactivity* mindfulness facet was significantly correlated with time needed to access personal positive specific memories in response to positive words ($r=-.41$; $p<.05$) and predicted this relationship ($\beta=-.41$; $p<.05$). This study provides data on the relationship between the mindfulness trait and ER, showing that mindfulness (specifically the *Non-reactivity* facet) is related to more adaptive ER.

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PALABRAS CLAVE
Mindfulness;
Regulación emocional;
Memoria autobiográfica

Acceso a la memoria autobiográfica como estrategia de regulación emocional y su relación con el *mindfulness*

Resumen La investigación en *mindfulness* se ha centrado en gran medida en los mecanismos de eficacia. La regulación emocional (RE) ha sido propuesta como uno de los mecanismos para explicar los efectos del *mindfulness* en la salud. La RE se compone de un amplio conjunto de estrategias, tales como el uso de la memoria autobiográfica (MA), que se refiere al recuerdo de eventos pasados experimentados personalmente para regular la emoción (p. ej., recordar un evento pasado positivo con el fin de calmar la ansiedad). Los autores sugieren que el *mindfulness* y la MA están relacionados. Sin embargo, existen pocos estudios que exploren esta relación que podría promover una RE más adaptativa. El objetivo de este estudio es explorar la relación entre el rasgo *mindfulness* y el uso de memorias específicas positivas (como una estrategia de RE) después de la inducción de tristeza. La muestra se compuso de 60 estudiantes universitarios sin experiencia en la meditación. Los participantes completaron el Inventario de depresión de Beck (BDI-II), el *Five Facets of Mindfulness Questionnaire* (FFMQ) y la Escala analógica visual (VAS). Antes de la tarea de MA se aplicó a los participantes una tarea de inducción emocional de tristeza usando realidad virtual. Los resultados mostraron que la faceta de *no reactividad* al *mindfulness* se correlacionaba significativamente con el tiempo necesario para acceder a determinados recuerdos positivos personales en respuesta a las palabras positivas ($r=-.41$; $p<.05$) y predijo esta relación ($\beta=-.41$; $p<.05$). Este estudio proporciona datos sobre la relación entre el rasgo *mindfulness* y la RE, lo que demuestra que el *mindfulness* (en concreto la faceta *no reactividad*) está relacionado con una RE más adaptativa.

Introduction

Mindfulness refers to a way of self-regulating attention to focus it on the present moment experience with an attitude of curiosity, openness, and acceptance of bodily sensations, thoughts and emotions (Bishop et al., 2004). The term mindfulness is used to refer to a state of awareness, which may be cultivated through systematic meditation practices or training, and a trait, which refers to a personal disposition to be mindful in daily life (Davidson, 2010).

Hölzel et al. (2011) summarized the mechanisms through which mindfulness is effective: attention regulation, body awareness, emotional regulation (ER), and change in the perspective of the self. These four components would interact in different ways, resulting in the benefits of mindfulness practice. Specifically, these components would interact to establish a process of greater self-regulation (Vohs, & Baumeister, 2004).

ER refers to a set of processes through which the individual influences the emotions he/she experiences, when he/she experiences them, and how they are perceived and expressed (Gross, 1998). One of these ER processes is the use of autobiographical memory (AM). AM refers to the recollection of personally experienced past events (Williams et al., 2007), such as remembering a positive past event in order to calm anxiety in the present (Holland, & Kensinger, 2010). AM has broadly been conceptualized as being divided into personal semantic information (i.e., facts about the self, such as knowing where one was born) and personal episodic information (i.e., unique events, such as remembering a first day of school) (Wheeler, Stuss, & Tulving, 1997). Recalling personal semantic information does not depend on retrieving particular experiences, but rather it is linked to feelings of "knowing" or familiarity. Recalling personal episodic information requires re-experiencing and recollecting particular past events (Wheeler, Stuss, & Tulving, 1997), and integrating information from a number of different subsystems (e.g., sensory information, language, emotion, narrative, etc.; Rubin, 2006).

AM serves a number of important functions in daily life, including some that are essential for social, self, and directive goals (Bluck, Alea, Habermas, & Rubin, 2005). However, AM is also related to several difficulties in functioning, as in emotion regulation (Griffith, Kleim, Sumner, & Ehlers, 2012; Hermans et al., 2008; Philippot, Schaefer, & Herbette, 2003). Literature shows that emotional disorders are characterized by difficulties in recalling and describing specific events from one's past (Griffith et al., 2012). Williams et al. (2007) found that individuals with depression and post-traumatic stress disorder retrieved overly general memories when attempting to recall memories of specific events, and this is a reliable feature of these diagnostic groups and other emotional disorders (Williams et al., 2007). "Specificity" refers to the degree to which individuals retrieve specific memories of personal experiences when asked to do so, that is, memories that occurred at a particular time and place and lasted less than one day (Crawley, 2015).

One of the mechanisms proposed to explain the effects of mindfulness training on health is the facilitation of more adaptive ER (Chambers, Gullone, & Allen, 2009; Chiesa, An-

selmi, & Serretti, 2014; Erisman, & Roemer, 2010; Hölzel et al., 2011). Thus, a greater awareness and acceptance of emotional experiences might enhance ER (Brown, & Ryan, 2003; Hayes, & Feldman, 2004; Hill, & Updegraff, 2012). Along these lines, Chiesa, Serretti, and Jakobsen (2013) proposed two conceptions of mindfulness as an ER strategy. In the first one (top-down ER strategy), mindfulness is defined as an increase in attention to the present moment experience without judgment and without cognitive re-evaluation of relevant stimuli, especially unpleasant ones. This conception is different from the Gross conceptualization of cognitive reappraisal, understood as a manipulation of the emotion before an emotional response is generated (Gross, 1998). In the second conception (bottom-up ER strategy), mindfulness is described as a central element that facilitates positive reappraisal. Chiesa et al. (2013) suggested that mindfulness training is associated with "top-down" ER in short-term practitioners, and with "bottom-up" ER in long-term practitioners.

The relationship between trait mindfulness and ER has also been explored. Keng, Robins, Smoski, Dagenbach, and Leary (2013) found that higher trait mindfulness predicted greater reductions in sadness across different conditions (receiving training in mindfulness, reappraisal, or no training, prior to undergoing an autobiographical sad mood induction). Pepping, O'Donovan, Zimmer-Gembeck, and Hanisch (2014) showed that in a clinically distressed sample, individuals low in mindfulness experienced greater psychosocial distress, which can almost fully be explained by their lack of access to ER strategies.

Regarding the specific relationship between AM as an ER strategy and mindfulness, several studies have shown that mindfulness training reduces overly general memories and increases AM specificity (e.g., Heeren, Van Broeck, & Philippot, 2009; Williams, Teasdale, Segal, & Soulsby, 2000). Jong-Meyer, Parthe, and Projektgruppe (2009) also found that mindfulness induction (compared to decentering on rumination) generated the highest number of specific memories.

The only study analyzing the relationships between trait mindfulness and memory specificity was recently carried out by Crawley (2015). This author concluded that higher trait mindfulness was associated with lower memory specificity and with more intense and more positive emotion during recall in a non-clinical student sample. Crawley suggested that the mindfulness trait could influence on memory encoding and the retrieval processes, as well as the mode of self-awareness that leads to a greater focus on momentary self-reference, and not on narrative. However, many aspects of the relationships among mindfulness, ER and AM still need to be evaluated (Hill, & Updegraff, 2012).

The aim of this study is to explore the relationship between the mindfulness trait and the use of positive specific memories (as an ER strategy) after sadness induction. Specifically, the first aim is to study the relationship between mindfulness trait facets and the time needed to access personal positive specific memories as an ER strategy in response to positive and neutral words. The second aim is to analyze the predictors of personal positive specific memories in response to positive and neutral words. We expected that dispositional mindfulness would provide faster access to autobiographical strategies, specifically regarding the use of positive specific memories.

Method

Sample

The final sample was composed of 60 participants (14 men and 46 women). The mean age of participants was 22.9 years (SD=3.85). All of them were volunteer students of Psychology with no mindfulness meditation experience, and they were asked to participate in a VR experiment that lasted approximately 1 hour. Participants who scored higher than 16 on the Beck Depression Inventory (BDI-II) were excluded.

Measures and tasks

- Beck Depression Inventory (BDI- II; Beck, Steer, & Brown, 1996; Sanz, Perdigón, & Vázquez, 2003): A 21-item inventory that assesses depression, with 4 response alternatives ranging from lowest to highest intensity. The Spanish adaptation shows good psychometric properties, such as good internal consistency (α=0.87) and good factorial and content validity.
- Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Cebolla et al., 2012; Aguado et al., 2015): A self-report questionnaire consisting of 39 items rated on a Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true), designed to measure trait mindfulness. It consists of 5 factors: observing, describing, acting with awareness, non-judging the inner experience, and non-reactivity to inner experience. The five scales show good internal consistency in both the English and Spanish versions. The total score for the FFMQ Spanish validation has an alpha coefficient of 0.88.
- Visual Analogue Scale (VAS; Gross, & Levenson, 1997): It is composed of 4 Likert scales (1: not at all - 7: totally) asking about the degree of four emotions (joy, sadness, anxiety, relaxation/tranquility).
- Autobiographical memory test (AMT; Williams, & Broadbent, 1986): The test includes nine cue words that are positive (joy, love, security, courage and success) and neutral (tree, jacket, shoe and lamp). Participants are asked to retrieve and briefly describe a positive and specific personal memory that happened at any time, but not in the previous week. Time (in seconds) to generate this specific memory was recorded using a stopwatch. This test has been shown to have good internal consistency (α=0.72) (Griffith, Kleim, Summer, & Ehlers, 2012).

Procedure

First, participants filled out the BDI-II to rule out people with depressive symptoms (BDI>16), the FFMQ, and the VAS. Then, participants received a sadness Mood Induction Procedure (MIP) using Virtual Reality (VR) (Baños et al., 2004; Van Strien et al., 2013). This induction includes a virtual scenario with several MIPs (self-referential phrases, images, film clips, music, autobiographical memory, and narrative) to induce sadness. Its effectiveness has been shown in several previous studies (Baños et al., 2004; Baños et al., 2005, 2007). (For a detailed description, see Van Strien et al., 2013). After the

induction, participants again filled out the VAS and then the autobiographical task.

Statistical Analysis
Student's t-test was conducted to check the effectiveness of the sadness induction. Correlation analysis was performed to explore the relationship between the mindfulness trait facets and the time needed to retrieve personal positive specific memories. Moreover, multiple regression analysis was applied to examine whether mindfulness facets predict the retrieval time to personal positive specific memories in response to positive and neutral words.

Results

Table 1 shows descriptive statistics for the FFMQ and VAS measures at pre-evaluation and post-evaluation. Differences between pre- and post-induction VAS scores were analyzed, and results showed that sadness increased significantly [($t_{(59)}$=22.03; p<.001); from M=1.69 (SD=0.9) to M=4.15 (SD=1.46)]. Pearson's two-tailed correlations were calculated between the participants' latency in generating the personal positive specific memories and the five Mindfulness facets (Table 2). Results showed that the latency was negatively and significantly correlated with the Non-reactivity to inner experience facet of Mindfulness (positive words: r =-.41; p<.05).

A multiple regression analysis was applied to examine whether facets of Mindfulness predicted latency. The results showed that the *Non-reactivity* facet was the only mindfulness facet predicting *Time to personal positive specific memories* in response to positive words (β=-.41; p<.05). The R^2 value was .20, showing the variance percentage explained by this factor. The other facets of mindfulness (observing, describing, awareness and non-judging) were excluded from the final model because they were not significant predictors.

Discussion and conclusions

The aim of the present study was to explore the relationship between dispositional mindfulness and ER strategies such as AM, defined as the use of positive specific memories after sadness mood induction. In the literature, different studies have shown that mood is related to memory, proposing memories as a common and effective ER strategy (Gillihan, Kessler, & Farah, 2007). Thus, one of the aims of the present study was to analyze whether dispositional mindfulness was related to this AM strategy. The results showed a negative and significant relationship between the non-reactivity facet of mindfulness and the latency or time it takes participants to retrieve personal positive specific memories.

Table 2 Correlations between the latency for personal positive specific memories and the five facets of mindfulness

	Latency for personal positive specific memories	
In response to	**neutral words**	**positive words**
Facets of Mindfulness		
Observing	-.28	-.04
Describing	-.31	-.07
Acting with awareness	-.09	-.14
Non-judging	.01	-.02
Non-reactivity	-.17	-.41*

*p<.05.

Results are in line with previous studies found in the literature about the relationship between dispositional mindfulness and the retrieval to ER strategies (Keng et al., 2013; Pepping, et al., 2014). Furthermore, the results are linked to the model proposed by Jimenez, Niles and Park (2010) for affect regulation and depressive symptoms. These authors suggest that mindfulness is associated with an adaptive affect regulation, reinforced by non-reactivity (the facet that correlated in the present study) and acceptance.

To our knowledge, only one study (Crawley, 2015) focused on the association between trait mindfulness and memory specificity. The author concluded that higher trait mindfulness was associated with lower memory specificity and with more intense and more positive emotion during recall in a non-clinical student sample. However, the instrument used in this study for the evaluation of trait mindfulness was the Freiburg Mindfulness Inventory (FMI; Walach et al., 2006). Therefore, the results focused on presence and acceptance mindfulness scores and not on the five facets of Mindfulness: Observing; Describe; Acting with awareness; Non-judging and Non-reactivity. Furthermore, the study associated the scores on mindfulness with memory specificity, but not with latency, as in the time it takes participants to retrieve the specific memories.

Along with the reported results, it should be noted that this study has several limitations. One of them is the limited sample size. Furthermore, all the participants were students with no mindfulness meditation experience, and so the results should be restricted to this population. In the future, it

Table 1 Means and standard deviation of FFMQ and VAS at pre- and post-evaluation

Facets of Mindfulness	M (SD)	Visual Analogue Scale	M (SD) PRE	M (SD) POST
Observing	23.50 (6.12)	Joy	4.33 (1.22)	2.97 (1.40)
Describing	28.53 (6.64)	Sadness	1.69 (0.9)	4.15 (1.46)
Acting with awareness	28.87 (6.50)	Anxiety	2.30 (1.28)	2.50 (1.40)
Non-judging	30.34 (6.70)	Relaxation/tranquility	4.56 (1.32)	3.90 (1.66)
Non-reactivity	21.22 (3.99)			

would be interesting to replicate these findings in a population with broader demographic characteristics. To take it a step further, it would be interesting to expand the goals of this study using a clinical population and a meditator sample to compare the results. Moreover, we did not analyze the content of the memories that the participants reported. Future studies could take these issues into account. Finally, we should mention that laboratory tests were used. For this reason, the explanatory power in daily life may be reduced.

Despite these limitations, the study results provide data on the relationship between dispositional mindfulness and ER, and the hypothesis initially proposed was confirmed. Therefore, dispositional mindfulness is related to more adaptive emotional regulation. Thus, it is expected that if we train this capacity, we can also enhance the ability to regulate our emotions in a more adaptive manner. More research is needed, and so future studies should test whether these results are affected by mindfulness training.

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