

The relationship between low levels of mindfulness skills and pathological worry: The mediating role of psychological inflexibility

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Título: La relación entre niveles bajos de habilidades de mindfulness y preocupación patológica: El rol mediador de la inflexibilidad psicológica.

Resumen: Recientemente, las intervenciones basadas en mindfulness se han propuesto para el tratamiento del trastorno de ansiedad generalizada. Sin embargo, no se conoce aún adecuadamente la naturaleza específica de la relación entre las habilidades de mindfulness y la preocupación patológica. Este estudio analiza el rol de la inflexibilidad psicológica, un constructo central en el modelo psicopatológico de la terapia de aceptación y compromiso (ACT), en el efecto que las habilidades de mindfulness tienen en la preocupación patológica. Un total de 132 participantes completaron instrumentos que miden los constructos de interés: el Penn State Worry Questionnaire (PSWQ), el Acceptance and Action Questionnaire – II (AAQ-II), y el Kentucky Inventory of Mindfulness Skills (KIMS). Puesto que la traducción al español del KIMS carecía de validación formal, se analizaron sus propiedades psicométricas y estructura factorial. Este proceso generó una versión reducida del KIMS con buena consistencia interna y estructura factorial. Los análisis de mediación revelaron que la inflexibilidad psicológica medió completamente los efectos de las habilidades de mindfulness en la preocupación patológica. En cuanto a las habilidades de mindfulness específicas, la inflexibilidad psicológica fue un mediador y supresor de las relaciones que tienen, respectivamente, la aceptación sin juicio y la acción consciente con la preocupación. Se discuten los resultados enfatizando la necesidad de poner los ejercicios de mindfulness al servicio de promover flexibilidad psicológica.

Palabras clave: preocupación patológica; trastorno de ansiedad generalizada; inflexibilidad psicológica; evitación experiencial; habilidades de mindfulness; terapia de aceptación y compromiso.

Abstract: Mindfulness-based interventions have recently been proposed for the treatment of generalized anxiety disorder (GAD). However, the specific nature of the relationship between mindfulness skills and pathological worry is still not very well known. This study analyzes the mediating role of psychological inflexibility—a central construct in the acceptance and commitment therapy (ACT) model of psychopathology—in the effect of mindfulness skills on pathological worry. A total of 132 nonclinical participants completed questionnaires assessing the constructs of interest: the Penn State Worry Questionnaire (PSWQ), the Acceptance and Action Questionnaire – II (AAQ-II), and the Kentucky Inventory of Mindfulness Skills (KIMS). Because the Spanish translation of the KIMS used lacked of a formal validation, its psychometric properties and factor structure were previously evaluated. This process led to a reduced version of the KIMS that showed good internal consistency and factor structure. Mediation analyses revealed that psychological inflexibility fully mediated the effects of mindfulness skills as a set on pathological worry. Regarding specific mindfulness skills, psychological inflexibility was shown to be a mediator and suppressor, respectively, of the relationship between acceptance without judgment and act with awareness on worry. Results are discussed emphasizing the need of using mindfulness exercises to promote psychological flexibility.

Key words: pathological worry; generalized anxiety disorder; psychological inflexibility; experiential avoidance; mindfulness skills; acceptance and commitment therapy.

Introduction

Worry consists of repetitive thoughts that are experienced as unpleasant and concerning an uncertain future outcome that is considered undesirable (Berenbaum, 2010). It represents one of the most evolved type of behavior because it allows us to anticipate possible future danger, experiment with ideas, and consider and evaluate alternative choices before implementing one of them (e.g., Mathews, 1990). However, excessive worry can also be a source of distress and is pervasive across anxiety and depressive disorders (e.g., Olatunji, Wolitzky-Taylor, Sawchuk, & Ciesielski, 2010). More specifically, maladaptive worry is the central feature of generalized anxiety disorder (GAD), with research strongly supporting the notion that it serves as an avoidant strategy in response to perceived future threats (e.g., Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004; Newman & Llera, 2011; Roemer & Orsillo, 2002). GAD tends to be a chronic disorder leading to significant functional impairment, associated with high rates of comorbidity (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Kessler, Waters, & Wittchen, 2004),

and difficult to treat, as a large proportion of individuals treated with cognitive behavioral therapy (CBT) do not improve significantly, and rates of relapse are high (e.g., Gould, Safren, Washington, & Otto, 2004; Waters & Craske, 2005).

During the past few years, several third-wave (Hayes, 2004) or contextual cognitive behavioral therapies (Hayes, Villatte, Levin, & Hildebrandt, 2012) have been proposed for the treatment of GAD, including Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), Dialectical Behavior Therapy (DBT; Linehan, 1993), Metacognitive Therapy (MCT; Wells, 2009), Mindfulness-based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002), and Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1990). The use of some kind of mindfulness techniques is common within the above-mentioned approaches. Specifically, mindfulness-based treatments such as MBSR and MBCT advocate the use of formal mindfulness meditation exercises as their central component.

Mindfulness involves paying attention nonjudgmentally in the present moment (e.g., Kabat-Zinn, 1994) and is usually conceptualized as a set of skills that can be trained by means of meditation practices and/or other related techniques (e.g., Baer, Smith, & Allen, 2004; Dimidjian & Linehan, 2003; Hayes & Shenk, 2003). One of the most popular classifications of mindfulness skills is the proposal by Baer et al. (2004), which identified the following four fac-

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ets: accepting without judgment (being nonjudgmental about present-moment experience), acting with awareness (consciously focusing on one thing at a time), describing (labeling the observed phenomena by coverly applying words), and observing (noticing a variety of internal stimuli, such as bodily sensations, cognitions, emotions, or external stimuli).

Because individuals with GAD continuously focus their attention on possible future danger, evaluate their private experiences negatively, and show a decreased awareness of the present moment (e.g., Roemer, Salters, Raffa, & Orsillo, 2005; Wells, 2002), mindfulness meditation seems to be especially well-suited for this disorder. It is believed that by teaching mindfulness skills, the use of worry as an avoidant strategy can be undermined. Indeed, both MBSR and MBCT have been reported to be effective in treating GAD in several studies (Craig, Rees, & Marsh, 2008; Evans, Ferrando, Findler, Stowell, Smart, & Haglin, 2008; Kabat-Zinn, Massion, Kristeller, & Peterson, 1992; Kim et al., 2009; Lee et al., 2007; see a review in Hofmann, Sawyer, Witt, & Oh, 2010).

However, some authors have argued that, although mindfulness can be useful in treating GAD, it can also lead to counterproductive effects when it is used with an inadequate rationale (e.g., Craske & Hazlett-Stevens, 2002; Rappagay, Bystritsky, Dafter, & Spearman, 2011; Wells, 2002). For instance, Wells (2002) warned that mindfulness may be counterproductive if it is used as a means of controlling or escaping from nonexistent threat because the nonoccurrence of the catastrophe could be attributed to the use of mindfulness. Similarly, Craske and Hazlett-Stevens (2002) and Rappagay et al. (2011) suggested that focusing on the present moment experience may be another subtle form of control used to avoid engaging with worry.

One less explored topic is the specific nature of the relationship between mindfulness skills and pathological worry. This is relevant because it could shed light on the adequate rationale for using mindfulness in the treatment of GAD. To our knowledge, only a couple of studies have addressed this topic by administering unidimensional measures of mindfulness. Roemer, Lee, Salters-Pedneault, Erisman, Orsillo, and Mennin (2009) investigated the relationships between mindfulness, difficulties in emotion regulation, and symptoms of GAD in nonclinical and clinical samples. In the first study, low scores of present moment attention and awareness, as measured by the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2000), and low scores of the accepting, open quality of awareness, as assessed by the Self-Compassion Scale (SCS; Neff, 2003), accounted for unique variance in GAD symptom severity, above and beyond variance shared with emotion regulation and depressive and anxious symptoms. In the second study, individuals with GAD obtained significantly lower scores on both the MAAS and SCS than control participants. Van Dam, Sheppard, Forsyth, and Earleywine (2011) used the same questionnaires to assess facets of mindfulness in a large community sample seeking self-help for anxious dis-

tress, finding that low scores on SCS better predicted pathological worry than low scores on MAAS.

Both the Roemer et al. (2009) and Van Dam et al. (2011) studies have advanced in analyzing the relationships between the lack of some mindfulness facets (i.e., present moment attention and the open and accepting quality of awareness) and pathological worry. However, as commented by Roemer et al. (2009), these studies have not analyzed the relationships between other mindfulness skills (e.g., observing and describing) and pathological worry. Moreover, it remains uninvestigated whether low levels of mindfulness skills have a direct effect on pathological worry or whether their effects are mediated by other constructs.

In our view, the ACT model of psychopathology and behavioral ineffectiveness, which emphasizes the pernicious role of experiential avoidance and psychological inflexibility, may shed some light on the relationship between mindfulness skills and pathological worry, and inform of the adequate rationale for using mindfulness meditation practice. Experiential avoidance refers to the occurrence of deliberate efforts to avoid and/or escape from private events such as affects, thoughts, memories, and bodily sensations that are experienced as aversive, even when doing so leads to actions that are inconsistent with one's values and goals (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). During the past few years, the ACT model has proposed psychological inflexibility as a broader concept that includes experiential avoidance because, although it involves negative, private experiences, it also includes neutral and positive ones (e.g., Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Psychological inflexibility entails the dominance of private experiences over chosen values and contingencies in guiding action (Bond et al., 2011). Accordingly, the aim of ACT is to promote psychological flexibility, defined as the ability to be in contact with the private experiences that surface in the present moment without needing to avoid and/or escape from them, and to adjust behavior according to the requirements of the situation in order to pursue valued ends. In doing so, ACT advocates the use, among others, of cognitive defusion exercises that are supposed to share common verbal processes with mindfulness (e.g., Hayes & Shenk, 2004; Luciano et al., 2011). Cognitive defusion techniques aim at changing the discriminative functions of private experiences by differentiating the person who is having them from the very private experiences as they emerge. Specifically, cognitive defusion seems to largely overlap with the mindfulness skill of accepting without judgment.

There is presently a huge amount of empirical evidence supporting the idea that experiential avoidance/psychological inflexibility is at the core of psychopathology and behavioral ineffectiveness (e.g., Farach, Mennin, Smith, & Mandelbaum, 2008; Hayes et al., 2006; López et al., 2010; Ruiz, 2010; Westin, Hayes, & Andersson, 2008) and that ACT is an effective treatment in those contexts (see reviews in Hayes et al., 2006; Ruiz, 2012). Regarding GAD and pathological worry, Roemer et al. (2005) found that psy-

chological inflexibility was related to them both in a nonclinical and clinical sample. Santanello and Gardner (2007) showed that psychological inflexibility mediated the relationship between maladaptive perfectionism and worry. These data are coherent with the main theoretical models of GAD, including the acceptance-based model of GAD (Roemer & Orsillo, 2002), which shares the emphasis on avoidance of internal affective experiences (for a review, see Behar, Dohrow, Hekler, Mohlman, & Staples, 2009). Several studies have also provided empirical evidence that ACT or acceptance-based treatments largely based on ACT are promising treatments for GAD (Arch et al., 2012; Roemer & Orsillo, 2007; Roemer, Orsillo, & Salters-Pedneault, 2008; Wetherell et al., 2011).

The current study was designed to explore whether the rationale for training in mindfulness meditation in individuals suffering from GAD and/or pathological worry should be to increase psychological flexibility levels. Specifically, the aim of this study was to test whether psychological inflexibility mediates the relationship between low levels of mindfulness skills and pathological worry. Questionnaires assessing the constructs of interest were administered to 132 nonclinical participants. Following the recommendation of Roemer et al., (2009), we used the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004), a multidimensional measure of mindfulness that may capture it more fully and would allow the analysis of the relationships between different mindfulness skills both with pathological worry and psychological inflexibility. As, to our knowledge, a Spanish version of the KIMS did not exist, we translated it and analyzed its psychometric properties and factor structure before proceeding with the remaining analyses. Based on previous research (e.g., Baer et al., 2004; Roemer et al., 2005, 2009; Santanello & Gardner, 2007; Van Dam et al., 2011), we predicted significant zero-order correlations between pathological worry, psychological inflexibility, and mindfulness skills as a set. We also predicted that accepting without judgment (i.e., being nonjudgmental about present-moment experience) and acting with awareness (i.e., focusing with awareness on one thing at a time) would be the mindfulness skills with higher correlations with psychological inflexibility and pathological worry. Finally, based on the acceptance-based model of GAD (Roemer & Orsillo, 2002), we hypothesized that psychological inflexibility would mediate the relationship between low levels of mindfulness skills and pathological worry.

Method

Participants

The sample consisted of 132 participants with an age range of 18 to 69 years ($M = 33.56$, $SD = 12.88$) from a university from the South of Spain. Sixty-three percent were women. The relative educational level of the participants were as follows: 65% college graduates or currently taking

university courses, 20% mid-level study graduates, and 15% primary studies.

Instruments

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990).

The PSWQ is a 16-item, 5-point Likert-type, self-report instrument that was designed for evaluating the permanent and unspecific degree of worry that characterizes GAD. Examples of items are “My worries overwhelm me” and “I know I shouldn’t worry about things, but I just can’t help it.” PSWQ internal consistency is high, within an alpha range between .93 and .95, and it shows good test-retest reliability and discriminant validity. We administered the translation into Spanish by Sandín, Chorot, Valiente, and Lostao (2009), which showed similar properties to the original PSWQ version.

Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011).

The AAQ-II is a general measure of experiential avoidance and psychological inflexibility. It consists of 7 items which are responded on a 7-point Likert scale. The items reflect unwillingness to experience unwanted emotions and thoughts (e.g., “I am afraid of my feelings,” “I worry about not being able to control my worries and feelings”) and the inability to be in the present moment and behave according to values-directed actions when experiencing psychological events that could undermine them (e.g., “My painful experiences and memories make it difficult for me to live a life that I would value,” “My painful memories prevent me from having a fulfilling life,” “Worries get in the way of my success”). Recent studies have shown that the AAQ-II has better psychometric properties and a clearer factor structure than the first AAQ version (Bond et al., 2011). In this study, we used the Spanish translation conducted by Ruiz, Langer, Luciano, Cangas, and Beltrán (2013), which has showed a one-factor solution, good internal consistency (mean $\alpha = .88$), and external validity.

Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004).

The KIMS is a 39-item, 5-point Likert-type scale that was designed to measure mindfulness skills. Four mindfulness skills are measured with this instrument: Accept Without Judgment (being nonjudgmental or non-evaluative about present-moment experience; e.g., “I tell myself that I shouldn’t be thinking the way I’m thinking”), Act with Awareness (consciously focusing on one thing at a time; e.g., “When I’m doing something, I’m focused on what I’m doing, nothing else”), Describe (labeling or noting the observed phenomena by covertly applying words; e.g., “I’m

good at finding the words to describe my feelings”), and Observe (noticing a variety of internal stimuli, such as bodily sensations, cognitions, emotions, or external stimuli, such as sounds and smells; e.g., “I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing”). These skills were found to be differentially related to several aspects of personality, mental health, psychological symptoms, and psychological inflexibility (Baer et al., 2004). The KIMS has good internal consistency and factor structure. As there was no validated Spanish translation of the KIMS when this study was conducted, a translation by the author was used. Psychometric properties and factor structure of this translation will be presented in the Results section.

Procedure

Participants were recruited from undergraduate psychology and pedagogy students and their personal contacts. Individuals who provided informed consent were given a questionnaire packet including the self-report instruments in the order listed above, in addition to others that are beyond the scope of this study. Upon completion of the study, we debriefed participants about the aims of the study and thanked them for their participation.

Data analytic strategy

The main aim of the study was to examine the potential role of psychological inflexibility as a mediator variable in the relationship between mindfulness skills and pathological worry. However, the Spanish translation of the KIMS lacked of formal validation. To overcome this limitation, a preliminary analysis of its psychometric and factor structure was first conducted. Internal consistency was analyzed for each KIMS subscale separately. Alpha coefficient was computed, and item-total and inter-item correlations were examined. To control for the possible defects of item translation into Spanish and to obtain a reduced version of the KIMS suitable for internal consistency and factor structure analyses (according to the suggestion of at least five participants per item; see Nunnally, 1978), items with the lowest item-total correlations were eliminated. Alpha coefficient was then recalculated, and both the Kaiser-Meyer-Olkin index and the Bartlett sphericity test were conducted to determine whether the resulting scale (that will be called KIMS-R) was appropriate for factor analysis. Lastly, exploratory factor analysis was conducted using principal axis factoring with oblique rotation to allow for correlations between factors.

After obtaining the psychometric and factor structure of the KIMS-R, we computed zero-order relationships between pathological worry (PSWQ), psychological inflexibility (AAQ-II), and mindfulness skills (KIMS-R). Then, five me-

diation analyses were conducted using the non-parametric bootstrapping procedure to estimate direct and indirect effects with the single mediator model described by Preacher and Hayes (2004). This method offers greater statistical power than both the traditional causal steps approach popularized by Baron and Kenny (1986) and the Sobel test (Sobel 1982), which uses normal theory confidence intervals (e.g., Hayes, 2009; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

In each mediation analysis, PSWQ scores served as dependent variable, AAQ-II scores were used as the proposed mediating variable, and age, gender, and educational level were entered as covariates. One mediation analysis was conducted for each of the following proposed independent variables: overall mindfulness skills (i.e., full KIMS-R scale), Accept without Judgment, Act with Awareness, Describe, and Observe. Mediation was deemed as significant if the 95% bias corrected and accelerated (BCa) bootstrap confidence intervals (CI) for the indirect effects based on 20000 bootstrapped samples did not include zero (see Preacher & Hayes, 2004). Additionally, the effect sizes of psychological inflexibility as a mediator in the effects of mindfulness skills on worry were computed using the completely standardized indirect effect (ab_c ; Preacher & Hayes, 2008; Preacher & Kelley, 2011) and providing 95% BCa bootstrap confidence intervals. This effect size measure relies on the product of betas for paths a and b , and can be interpreted as the expected change in the dependent variable (i.e., PSWQ scores) per unit change in the predicting variables (i.e., KIMS-R and its subscales) that occurs indirectly through the mediator (i.e., AAQ-II). Following Kenny's (2011) suggestion based on Cohen (1988), small, medium, and large effect sizes would be, respectively, .01, .09, and .25.

Results

Internal consistency of the KIMS-R

As previously stated, items with the lowest item-total correlations were eliminated to obtain a reduced version of the KIMS that would be suited for internal consistency and factor structure analyses. Eighteen items were eliminated. All final subscales contained five items except for Accept without Judgment, which contained six (see in Table 1 the items that remained in the KIMS-R, and their translation into Spanish in Appendix I). Internal consistency of the resulting scale was good ($\alpha = .84$). The KIMS-R subscales also showed adequate internal consistencies. Specifically, Table 1 shows that the alpha coefficients for Accept without Judgment, Acting with Awareness, Describe, and Observe were .84, .83, .88, and .77, respectively.

Table 1. Factor structure of the KIMS-R.

Item number and content	Factor loadings			
	1	2	3	4
<i>Accept without judgment items</i>				
2.* I criticize myself for having irrational or inappropriate emotions.	.20	.68	-.02	-.06
6.* I tell myself that I shouldn't be feeling the way I'm feeling.	-.10	.57	-.16	-.12
8.* I believe some of my thoughts are abnormal or bad and I shouldn't think that way.	.24	.65	.04	.01
14.* I tell myself that I shouldn't be thinking the way I'm thinking.	.43	.72	-.04	-.00
17.* I think some of my emotions are bad or inappropriate and I shouldn't feel them.	.41	.81	.01	-.07
20.* I disapprove of myself when I have irrational ideas.	.11	.70	-.13	-.19
<i>Act with awareness items</i>				
4. When I'm doing something, I'm only focused on what I'm doing, nothing else.	.80	.19	.32	.18
7. When I'm reading, I focus all my attention on what I'm reading.	.59	.24	.32	.34
9. When I do things, I get totally wrapped up in them and don't think about anything else.	.76	.25	.25	.18
11.* I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.	.60	.30	.25	.23
21. I get completely absorbed in what I'm doing, so that all my attention is focused on it.	.81	.28	.23	.18
<i>Describe items</i>				
1. I'm good at finding the words to describe my feelings.	.14	-.18	.82	.41
3. I can easily put my beliefs, opinions, and expectations into words.	.33	.02	.88	.36
5. I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.	.42	-.08	.62	.37
13. Even when I'm feeling terribly upset, I can find a way to put it into words.	.29	-.00	.89	.44
19. My natural tendency is to put my experiences into words.	.35	-.06	.69	.23
<i>Observe items</i>				
10. I pay attention to sensations, such as the wind in my hair or sun on my face.	.10	-.15	.40	.67
12. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.	.16	-.17	.19	.76
15. I notice the smells and aromas of things.	.12	-.09	.31	.69
16. I intentionally stay aware of my feelings.	.41	.05	.44	.51
18. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.	.33	.07	.31	.55
Coefficient alpha	.83	.84	.88	.77
Mean inter-item correlation	.51	.47	.60	.40
Eigenvalue	5.59	4.04	1.68	1.65
Percentage of variance accounted for	26.60	19.22	8.01	7.86

*Reverse-scored item

Factor structure of the KIMS-R

Preliminary analysis showed that the KIMS-R was appropriate for factor analysis, as the Kaiser-Meyer-Olkin index was .82 and the Bartlett sphericity test was statistically significant ($X^2 = 1344.44$, $p < .001$). Table 1 shows the results of the factor analysis conducted with principal axis factoring and oblique rotation. As expected, this analysis yielded four factors with eigenvalues greater than 1.0, which cumulatively accounted for 61.82% of the variance. All the items had loadings of .50 or greater on their expected corresponding factor.

Descriptive data, internal consistencies and zero-order correlations

Table 2 shows the descriptive data, internal consistencies obtained for each scale, and the correlations between

measures in the current study. Participants' mean scores on pathological worry (PSWQ) and psychological inflexibility (AAQ-II) did not differ significantly from scores obtained with Spanish nonclinical populations in other studies (e.g., Ruiz et al., 2013; Sandín et al., 2009). Good internal consistencies were found for both instruments (PSWQ: $a = .92$, AAQ-II: $a = .86$). As expected, KIMS-R scores correlated significantly with psychological inflexibility ($r = -.38$) and pathological worry ($r = -.20$). However, psychological inflexibility showed the highest correlation with pathological worry ($r = .56$) followed by Accept without Judgment ($r = -.42$). None of the remaining mindfulness skills showed significant correlations with the PSWQ scores. With regard to the KIMS-R subscales, AAQ-II scores correlated significantly in the expected direction with Accept without Judgment ($r = -.49$) and Act with Awareness ($r = -.31$). Lastly, as in the original study (Baer et al., 2004), correlations between the KIMS subscales were modest.

Table 2. Descriptive Data, Internal Consistencies and Correlations.

	2	3	4	5	6	7	<i>M</i>	<i>SD</i>	<i>α</i>
1 PSWQ	.56***	-.20*	-.42***	.00	-.06	.01	50.5	11.7	.92
2 AAQ-II		-.38**	-.49***	-.31**	-.12	-.01	21.0	7.9	.86
3 KIMS-R – total			-.50***	.78***	.68***	.66***	68.6	11.4	.84
4 Accept				.33***	-.06	-.08	20.1	4.9	.84
5 Act/awareness					.37***	.32***	16.7	4.2	.83
6 Describe						.46***	15.8	4.7	.88
7 Observe							15.9	15.9	.77

Note. PSWQ: Penn State Worry Inventory; AAQ-II: Acceptance and Action Questionnaire – II; KIMS-R: Kentucky Inventory of Mindfulness Skills – Reduced. * $p < .05$; ** $p < .01$, *** $p < .001$

Mediation analyses of the effect of low levels of mindfulness skills on pathological worry through psychological inflexibility

Table 3 shows the data concerning the mediation analyses conducted to explore the mediating role of psychological inflexibility in the effect of overall mindfulness skills and each of the KIMS-R factors on pathological worry. As independent variable, mindfulness skills as a set significantly predicted the proposed mediator variable (i.e., psychological inflexibility; path *a*: $TE = -.265$, $SE = .058$, $p < .001$) and the dependent variable (i.e., pathological worry; path *c* or total effect: $TE = -.195$, $SE = .089$, $p < .05$). However, the latter prediction became nonsignificant when psychological inflexibility was included in the model (path *c'* or direct effect: $TE = .009$, $SE = .084$, $p = .917$). The total indirect effect of mindfulness skills on pathological worry through psychological inflexibility was significant (path *ab*), with a point estimate of $-.203$ ($SE = .054$) and a 95% BCa CI of $-.324$ to $-.110$. The effect size of the indirect effect was medium-large ($ab_{\alpha} = -.203$, 95% BCa CI of $-.317$ to $-.108$). Therefore, the mediation analysis revealed that psychological inflexibility fully mediated the relationship between low levels of mindfulness skills as a set and pathological worry.

Concerning Accept without Judgment, it significantly predicted psychological inflexibility (path *a*: $TE = -.736$, $SE = .136$, $p < .001$) as well as pathological worry (path *c* or total effect: $TE = -.847$, $SE = .204$, $p < .001$). However, when controlling for psychological inflexibility, the effect of Accept without Judgment on pathological worry became nonsignificant (path *c'* or direct effect: $TE = -.359$, $SE = .205$, $p = .083$). The indirect effect of Accept without Judgment on pathological worry through psychological inflexibility was significant (path *ab*: point estimate = $-.489$, $SE = .120$, 95% BCa CI of $-.770$ to $-.287$) with a medium-large effect size ($ab_{\alpha} = -.208$, 95% BCa CI of $-.325$ to $-.121$). Thus, psychological inflexibility also fully mediated the effect of low levels of Accept without Judgment on pathological worry.

Regarding Act with Awareness, its scores significantly predicted scores on psychological inflexibility (path *a*: $TE = -.597$, $SE = .162$, $p < .001$). Although Act with Awareness alone did not predict pathological worry (path *c* or total effect: $TE = .060$, $SE = .246$, $p = .806$), it did predict worry when psychological inflexibility was included in the model (path *c'*: $TE = .575$, $SE = .215$, $p < .01$). The indirect effect of Act with Awareness on pathological worry through psychological inflexibility was also significant (path *ab*: point estimate = $-.515$, $SE = .171$, 95% BCa CI of $-.890$ to $-.221$), with a medium effect size ($ab_{\alpha} = -.188$, 95% BCa CI of $-.328$ to $-.080$). The results of this mediation analysis revealed that psychological inflexibility was a significant suppressor of the relationship between Act with Awareness and pathological worry. This means that after controlling for psychological inflexibility, greater levels Act with Awareness predicted higher pathological worry.

Lastly, mediation analyses found no significant indirect effect of Describe and Observe on pathological worry through psychological inflexibility. Neither Describe nor Observe were significant predictors of psychological inflexibility (paths *a*; Describe: $TE = -.295$, $SE = .150$, $p = .053$; Observe: $TE = -.071$, $SE = .184$, $p = .700$) and pathological worry (paths *c* or total effect; Describe: $TE = -.291$, $SE = .218$, $p = .183$; Observe: $TE = -.068$, $SE = .264$, $p = .798$). Likewise, they were not predictors when entering psychological inflexibility in the model (paths *c'* or direct effect; Describe: $TE = -.069$, $SE = .190$, $p = .716$; Observe: $TE = -.014$, $SE = .225$, $p = .951$). The indirect effects of both mindfulness skills on pathological worry through psychological inflexibility were nonsignificant (paths *ab*; Describe: point estimate = $-.222$, $SE = .127$, 95% BCa CI of $-.492$ to $.009$; Observe: point estimate = $-.054$, $SE = .134$, 95% BCa CI of $-.267$ to $.172$), although the indirect effect of Describe was statistically significant at a 90% BCa CI of $-.445$ to $-.030$, with a medium effect size ($ab_{\alpha} = -.092$, 95% BCa CI of $-.182$ to $-.012$).

Table 3. Data from the mediation analyses of the effects on pathological worry of mindfulness skills as a set and each of them separately.

Paths	Regression analyses	Coeff. or Point Estimate	SE	T	Bootstrapping BC 95% CI	
					Lower	Upper
OVERALL MINDFULNESS SKILLS						
a	DV – Psychological inflexibility KIMS-total	-.265	.058	-4.571***		
b	DV – Pathological worry Psychological inflexibility	.767	.123	6.253***		
c	DV – Pathological worry KIMS total effect	-.195	.089	-2.197*		
c'	KIMS direct effect	.009	.084	.105		
ab	KIMS indirect effect via PI	-.203	.054		-.324	-.110
ACCEPT WITHOUT JUDGMENT						
a	DV – Psychological inflexibility Accept without Judgment	-.736	.136	-5.409***		
b	DV – Pathological worry Psychological inflexibility	.664	.125	5.328***		
c	DV – Pathological worry Accept total effect	-.847	.204	-4.159***		
c'	Accept direct effect	-.359	.205	-1.749		
ab	Accept indirect effect via PI	-.489	.120		-.770	-.287
ACT WITH AWARENESS						
a	DV – Psychological inflexibility Act with Awareness	-.597	.162	-3.683***		
b	DV – Pathological worry Psychological inflexibility	.862	.116	7.443***		
c	DV – Pathological worry Act total effect	.060	.246	.246		
c'	Act direct effect	.575	.215	2.681**		
ab	Act indirect effect via PI	-.515	.171		-.890	-.221
DESCRIBE						
a	DV – Psychological inflexibility Describe	-.295	.150	-1.959		
b	DV – Pathological worry Psychological inflexibility	.754	.115	6.575***		
c	DV – Pathological worry Describe total effect	-.291	.218	-1.338		
c'	Describe direct effect	-.069	.189	-.365		
ab	Describe indirect effect via PI	-.222	.127		-.492	.009
OBSERVE						
a	DV – Psychological inflexibility Observe	-.071	.184	-.386		
b	DV – Pathological worry Psychological inflexibility	.761	.113	6.737***		
c	DV – Pathological worry Observe total effect	-.068	.264	-.257		
c'	Observe direct effect	-.014	.225	-.062		
ab	Observe indirect effect via PI	-.054	.134		-.267	.172

Note. DV: dependent variable; KIMS: Kentucky Inventory of Mindfulness Skills; PI: psychological inflexibility. * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

This study examined the hypothesis that the relationship between low levels of mindfulness skills and pathological worry would be mediated by psychological inflexibility. As a previous step, a measure of mindfulness skills (i.e., the KIMS) was translated and adapted into Spanish, showing good internal consistency and factor structure. Low levels of mindfulness skills as a set were significantly related to patho-

logical worry and psychological inflexibility. Specifically, the ability of being nonjudgmental about present-moment experience (i.e., Accept without Judgment) was the mindfulness skill that showed the highest, negative correlations with both constructs. Subsequent mediation analyses suggested that psychological inflexibility fully mediated the relationship between low levels of mindfulness skills as a set and pathological worry. With regard to specific mindfulness skills, the relationship between low levels of Accept without Judgment

and pathological worry was also mediated by psychological inflexibility. Finally, psychological inflexibility was a suppressor of the relationship of the ability to focus with awareness on one thing at a time (i.e., Act with Awareness) and pathological worry. That is, when the positive effects of Act with Awareness on behaving with psychological flexibility were excluded, the results showed that higher levels of this mindfulness skill predicted greater pathological worry. This seems plausible to the extent that the ability of acting with awareness could lead to the enhancement of: (a) concentration in worry as a mean of controlling fear, and/or (b) actively avoiding worry by focusing attention on the present moment. This last option is consistent with the suggestion that focusing on the present moment experience may be another subtle form of control used to avoid engaging with worry (Craske & Hazlett-Stevens, 2002; Rappay et al., 2011).

Previous studies have found that low levels of mindfulness skills and psychological inflexibility are significantly correlated to pathological worry (e.g., Roemer et al., 2009; Santanello & Gardner, 2007; Van Dam et al., 2011). Also, as shown repeatedly in the literature, mindfulness skills and psychological inflexibility are negatively correlated. Specifically, the relationships of psychological inflexibility with Accept without Judgment and Act with Awareness are highly consistent and have been obtained on numerous occasions (e.g., Baer et al., 2004). In this sense, the current study provides further empirical evidence of the relationships between all these constructs. Particularly, this study is the first evidence that the beneficial effect of mindfulness skills on the reduction of pathological worry might be mediated by increases in psychological flexibility.

If further study supports the relationships between low levels of mindfulness skills and pathological worry and, particularly, the mediating role of psychological inflexibility, this would have implications for the treatment of disorders characterized by pathological worry. First, not all mindfulness skills seem to be related to pathological worry. Specifically, the abilities to notice internal and external stimuli (i.e., Observe) and to label these phenomena (i.e., Describe) do not appear to be especially relevant in pathological worry. Second, according to the results of this study, the ability to focus with awareness on one thing at a time (i.e., Act with Awareness) might be misused by individuals with poor psychological flexibility by actively avoiding worry or improving concentration on worry in order to avoid fear. Third, the ability of being nonjudgmental about present-moment experience (i.e., Accept without Judgment) is the mindfulness skill most closely related to the lack of pathological worry and it seems to exert its effects by enhancing psychological flexibility.

According to these findings, developers of mindfulness-based interventions for pathological worry and GAD might consider: (a) reducing the number of interactions aimed at enhancing observing and describing, (b) explicitly linking the use of acting with awareness with behaving according to valued goals and not as way of avoiding worry and fear or of

enhancing the use of worry as an avoidance strategy, and (c) making a major effort to promote accepting without judgment as a way of allowing people to contact the fears and worries that surface in the present moment without needing to avoid them and to adjust their behavior according to the requirements of the situation in order to pursue valued ends (i.e., promoting psychological flexibility). The last two suggestions are completely consistent with the ACT model and point to the direction of incorporating ACT rationale in mindfulness-based therapies.

The present study has a major limitation. The cross-sectional design used precludes determining causal relationships among variables, as such relationships cannot be assumed without establishing temporal precedence. Accordingly, further studies might explore if the current findings hold in a longitudinal design. Some additional limitations of this study are worth mentioning. Firstly, as all data were obtained using self-report measures, relationships among variables might be artificially inflated. Secondly, as the sample was made up of nonclinical participants, generalizability of the current findings may be limited. Future studies might examine the mediating role of psychological inflexibility in populations with clinical levels of pathological worry (e.g., individuals with GAD) and using behavioral measures. Finally, the Spanish translation of the KIMS we used lacked previous formal validation. A preliminary analysis of its psychometric properties and factor structure was conducted in this study, but it involved reducing the scale to almost half of the items. Although this version of the KIMS showed similar psychometric properties and factor structure to the original English version, some of the mindfulness skills may be underrepresented due to the reduction of items. Further studies should use previously validated versions of mindfulness skills.

In conclusion, this study supports the ACT model of psychopathology. This model emphasizes the central role of experiential avoidance and psychological inflexibility in the development of psychological disorders such as generalized anxiety disorder. From this perspective, the inability to remain in contact with fear and anxiety while doing valued actions could lead to the use of worry as an avoidance coping strategy. Worry is then negatively reinforced due to the immediate reduction of these aversive experiences and positively reinforced when the person follows rules that point to the need of getting rid of fear and anxiety in order to avoid fatal consequences. In this way, a pattern of worrying in response to fear is shaped, and its use is generalized. However, this pattern is only effective in the short term because, in the long term, due to the characteristics of language and cognition, fears are extended and return in a boomerang effect, provoking further engagement with worry (e.g., Hayes et al., 1996; Luciano, Valdivia-Salas, & Ruiz, 2012; Törneke, Luciano, & Valdivia-Salas, 2008). Worry itself usually becomes a source of suffering and another experience to avoid, which makes the situation even worse. According to this analysis, the aim of ACT in the treatment of GAD is to promote be-

behavioral flexibility in dealing with fear and worry so that the person can remain in contact with them without needing to avoid them and simultaneously engage in valued actions. Some mindfulness skills seem to play a relevant role in doing

so. Of particular relevance is the ability to be nonjudgmental about present-moment experience, which seems to overlap largely with the ACT concept of cognitive defusion (e.g., Hayes & Shenk, 2004; Luciano et al. 2011).

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Appendix I. KIMS translation into Spanish – reduced version.**KIMS**

Evalúe cada uno de las siguientes afirmaciones usando la escala de abajo. Escriba el número (en el espacio en blanco a la izquierda de cada ítem) que describa mejor su propia opinión de lo que es generalmente cierto para usted.

1	2	3	4	5
Nunca o casi nunca es verdad	Raramente verdad	A veces es verdad	Frecuentemente es verdad	Muy frecuentemente o siempre es verdad

- ____ 1. Se me da bien poner mis sentimientos en palabras.
- ____ 2. Me critico a mí mismo por tener emociones inapropiadas o irracionales.
- ____ 3. Puedo poner fácilmente mis propias creencias, opiniones y expectativas en palabras.
- ____ 4. Cuando estoy haciendo algo, sólo me centro en lo que estoy haciendo y en nada más.
- ____ 5. Se me da bien encontrar palabras que expresen mis percepciones como por ejemplo: el olor de las cosas, su tacto o su sonido.
- ____ 6. Me digo que no debería estar sintiéndome del modo en que me siento.
- ____ 7. Cuando estoy leyendo, pongo toda mi atención en la lectura.
- ____ 8. Creo que algunos de mis pensamientos son malos o anormales y que no debería tenerlos.
- ____ 9. Cuando hago cosas, me quedo completamente concentrado en ellas y no pienso en nada más.
- ____ 10. Presto atención a sensaciones como el viento en mi pelo o el sol en mi cara.
- ____ 11. No suelo poner la atención en lo que estoy haciendo porque estoy fantaseando, preocupándome o distrayéndome.
- ____ 12. Presto atención a los sonidos como el piar de los pájaros, los coches pasando o el sonido del reloj.
- ____ 13. Incluso cuando me siento muy mal, puedo encontrar el modo de ponerlo en palabras.
- ____ 14. Suelo decirme que no debería estar pensando del modo en que lo hago.
- ____ 15. Noto el olor y el aroma de las cosas.
- ____ 16. Soy consciente de mis sentimientos intencionadamente.
- ____ 17. Considero que algunas de mis emociones son malas e inapropiadas y que no debería sentirlas.
- ____ 18. Noto elementos visuales en obras de arte o la naturaleza como los colores, formas, texturas, y patrones de luz y oscuridad.
- ____ 19. Mi tendencia natural es poner mis experiencias en palabras.
- ____ 20. Me critico a mí mismo cuando tengo ideas irracionales.
- ____ 21. Estoy completamente absorto en lo que estoy haciendo, es decir, toda mi atención está puesta en eso.