Negative metacognitive beliefs moderate the influence of perceived stress and anxiety in long-term anxiety

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ABSTRACT

Metacognitive theory of emotional disorders (Matthews and Wells, 1994; Wells, 2009) suggests that metacognitive beliefs can play a causal role in the development and maintenance of anxiety symptoms. In this prospective study, we examine the relationships between metacognitive beliefs, perceived stress and anxiety in a non-clinical sample. Participants were 135 undergraduate students who completed a battery of questionnaire at two time points (3- months apart). Results revealed metacognitive beliefs do not predict long-term anxiety independently. However, moderation analyses demonstrated negative beliefs about uncontrollability and danger prospectively moderated the relationship between perceived stress and Time 2 anxiety. Negative metacognitive beliefs also interacted with baseline anxiety to predict the change in anxiety symptoms. The results confirm metacognitions play a causal role in anxiety and have implications for cognitive models and the treatment of anxiety.

Metacognition refers to stable knowledge about one's own cognitive system, knowledge about factors that affect the functioning of this system, regulation and awareness of the current state of cognition, and appraisal of the significance of thoughts and memories (Wells, 1995). The Self-Regulatory Executive Function model (S-REF; Wells and Matthews, 1994) proposes that emotional disorders are linked to beliefs about thinking called metacognitive beliefs (Wells, 2000; Wells and Carter, 2001). These metacognitive beliefs (e.g., "I cannot control my thoughts") guide the selection of maladaptive coping and regulation strategies which increase the accessibility of negative information through perseverative thinking (e.g., worry), threat monitoring, avoidance, and thought suppression (Wells, 2000), enhancing the emotional distress.

This approach suggests metacognitive beliefs can be causal factors in predicting the development and maintenance of anxiety (Bailey and Wells, 2015) and a broad range of psychological disorders such as depression and anxiety disorders (Ruscio and Borkovec, 2004; Spada et al., 2010; Wells, 1999, 2005; Wells and Carter, 2001). More specifically, studies have shown relationships between metacognitive beliefs and emotional distress (Spada et al., 2008), pathological anxiety (van der Heiden et al., 2010), obsessive-compulsive symptomatology (Sassaroli et al., 2015), health anxiety (Bailey and Wells, 2015), prolonged worry (Esbjørn et al., 2015; Thielsch et al., 2015), and

anxiety sensitivity (Yoris et al., 2015). In sum, metacognitive beliefs can be a potential core of emotion regulation factors, playing a role in cause and maintenance of anxiety level which emerges as a transdiagnostic variable in clinical samples (McEvoy et al., 2013).

Despite evidence for the S-REF model, some important aspects need to be empirically validated. Key evidence for the theory comes from cross-sectional studies and it needs to be tested with prospective studies. With regard to prospective studies, Papageorgiou and Wells (2009) found that negative beliefs about uncontrollability and harm of rumination explained Time 2 depressive symptoms, after controlling for baseline symptoms. Also, Weber and Exner (2013) found that Time 1 positive beliefs about rumination explained rumination and depressive symptoms in Time 2. In an ecological assessment study, Thielsch et al. (2015) found that negative metacognitive beliefs were significantly correlated with daily worry in adolescents. In another longitudinal study (Sica et al., 2007), negative beliefs about worry relating to such beliefs about uncontrollability and danger were associated with worry and obsessive symptoms at a four month follow-up. With regard to anxiety, Hjemdal et al. (2013) found that metacognitive beliefs explained anxiety levels in a three month period and Bailey and Wells (2015) found metacognitive beliefs were prospective predictors of health anxiety after controlling for cognitive variables in a six month period.

Finally, based on a vulnerability-stress approach, Yilmaz et al. (2011) examined the relationship between metacognitive beliefs, perceived stress, and anxiety. They found a relationship between negative metacognitive beliefs in Time 1 and anxiety in Time 2, and cognitive confidence moderated the effect of perceived stress in Time 2 anxiety. However, they found different dimensions of metacognition as prospective predictors of anxiety level, depending on the stress measure used. Specifically, they found that negative beliefs about uncontrollability and danger predicted anxiety and depression independent of stressful life events, while low cognitive confidence interacted with other stress issues (e.g., daily hassles for college students). Their results suggest different metacognitive beliefs may be involved, depending on the nature of stress experienced and the pattern of emotional symptoms reported; these interactions were found only for anxiety.

All of these results are consistent with a causal and maintenance role of metacognitive beliefs in anxiety; however, more longitudinal studies need to be carried out to corroborate these causal effects, because the effect of perceived stress in these relationships is unclear. Following the basic principle of this model (Wells, 1995), metacognitive beliefs guide the activity of thinking to cope with and regulate emotions enhancing emotional distress (e.g., anxiety). Therefore, it is expected to find that metacognitive beliefs can act as individual variables that moderate the effect of previous levels of perceived stress and explain the interplay between baseline anxiety and long-term anxiety. In other words, we understand that predisposing factors like perceived stress and anxiety may help to make sense of the whole process. Previous levels of anxiety and stress could become a symptom in presence of these metacognitive beliefs.

In this longitudinal study we aimed to analyse the interplay between metacognitive beliefs, perceived stress, and anxiety level in a non-clinical sample. In particular, we expect that first, metacognitive beliefs will predict long-term anxiety; second, metacognitive beliefs will moderate the perceived stress effect, by examining this relationship with a different perceived stress self-report than used previously (Yilmaz et al., 2011); and third, metacognitive beliefs moderate the effect of the previous anxiety level in long-term anxiety levels.

1. Method

1.1. Participants

The participants in this study were 135 undergraduate students (88.9% women) with ages ranging from 19 to 34 years (M=21.62, SD =2.38), of whom 119 (90.8% women) with ages ranging from 19 to 29 years (M=21.24, SD =2.00) returned to complete follow-up questionnaires three months later. Participants from the initial sample who failed to return for the Time 2 follow-up session did not significantly differ in any key variable measured in this study from those who completed the questionnaires at both time points.

2. Instruments

2.1. Beck Anxiety Inventory

(BAI; Beck et al., 1988). The inventory consists of 21 items and is a 4-point Likert type measure of cognitive and somatic symptoms of anxiety. Scores range from 0 to 63, with higher scores indicating higher levels of anxiety. Good internal consistency and high short-term test-retest reliability have been demonstrated in mixed psychiatric samples and patients with anxiety disorders (Beck et al., 1988; de Beurs et al., 1997), as well as non-clinical samples (Creamer et al., 1995). The Spanish version of BAI (Magán et al., 2008) showed good psychometric properties and in this study Cronbach's alpha was .89.

2.2. Meta-Cognitions Questionnaire-30

(MCQ-30; Wells and Cartwright-Hatton, 2004). This measure assesses individual differences in metacognitive beliefs, judgments, and monitoring tendencies. It comprises five subscales involving a total of 30 items. Responses to each item on the MCQ-30 are on a 4-point Likert scale, from 1="do not agree" to 4="strongly agree". MCQ-30 scores range from 30 to 120 points and higher scores indicate greater pathological metacognitive activity. The five subscales measure the following dimensions: (1) positive beliefs about worry (e.g., "worrying helps me cope"); (2) negative beliefs of uncontrollability and danger (e.g., "when I start worrying I cannot stop"); (3) cognitive confidence (e.g., "my memory can mislead me at times"); (4) need to control thoughts (e.g., "not being able to control my thoughts is a sign of weakness"); and (5) cognitive self-consciousness (e.g., "I pay close attention to the way my mind works"). The MCQ-30 shows good psychometric properties and the same factor structure in the Spanish adaptation (Ramos-Cejudo et al., 2013) and in this study it has a Cronbach's alpha rating from .60 to .89.

2.3. Perceived stress scale

(PSS; Cohen et al., 1995). This scale is a core self-report instrument that evaluates the level of perceived stress during the last month and consists of 14 items with a 5-point response scale (0= never, 1= almost never, 2= once in a while, 3= often, 4= very often). The total score of the PSS is obtained by reversing the scores of items 4, 5, 6, 7, 9, 10, and 13 (in the following manner: 0=4, 1=3, 2=2, 3=1, and 4=0) and subsequently adding the 14 item scores. A higher score indicates a higher level of perceived stress. The European Spanish version of PSS was developed with good psychometric properties (Remor, 2006) and in this study Crombach's alpha was .90.

3. Procedure

A method of convenience sampling was used to obtain the sample. Participants who had taken part in the first stage were also asked whether they would like to be included in the second stage of the study, which would occur three months after the completion of current one. If they agreed, an identification code known only by the participant was written on the cover page of the instrument batteries. Once the participants consented to take part again, then the personal identification codes they had provided in the first stage were used to match the Time 2 measurements. The cover page of the instrument batteries of Time 1 and Time 2 included an information sheet, consent form, the personal identification code to be filled in (optional), and information about demographic variables. Participants were volunteers who received no credit for participation in the study. The questionnaires were administered in paper and pencil format and instructions were provided in writing. Ethical review boards at a Spanish university granted ethics approval for the study.

4. Results

4.1. Descriptive statistics and correlational analyses

Descriptive statistics, reliability, and zero-order correlations are shown in Table 1. Overall, higher levels of metacognitive beliefs were associated with higher levels of anxiety symptoms in both Time 1 and Time 2. Negative beliefs, need to control thoughts, and cognitive self-consciousness were found to have significant correlations with anxiety in Time 1 and negative beliefs and cognitive self-consciousness were found to have significant correlations with anxiety in Time 2; the magnitude of these correlations ranged from strong to weak. Similar results were found in the relationships between metacognitive beliefs and perceived stress, with significant correlations for negative beliefs,

Table 1

Zero-order correlations between Time 1 metacognitive beliefs and perceived stress and Time 1 and Time 2 anxiety symptoms, and partial correlations between Time 1 metacognitive beliefs and perceived stress and Time 2 anxiety symptoms.

	Time 1 (N=135)							Time 2 (N=119)	
	1	2	3	4	5	6	7	Anxiety	Anxiety (Time 1 Anxiety controlled)
1.Positive Beliefs	–	.02	$.21^*$	$.25^{**}$	$.24^*$	.04	.11	.05	−.06
2.Negative Beliefs		–	.04	$.47^{**}$	$.40^{**}$	$.42^{**}$	$.54^{**}$	$.41^{**}$	.10
3.Cognitive Confidence			–	$.26^{**}$	.04	.07	.13	.13	.04
4.Need to control thoughts				–	$.43^{**}$	$.23^{**}$	$.29^{**}$	.14	−.06
5.Cognitive self-consciousness					–	$.31^{**}$	$.38^{**}$	$.35^*$	.11
6.Perceived Stress						–	$.58^{**}$	$.34^{**}$	−.07
7.Anxiety (Time 1)							–	$.70^{**}$	
M	11.01	11.24	10.88	10.03	14.17	13.44	11.44	9.89	
(SD)	(4.07)	(3.46)	(4.61)	(2.77)	(3.96)	(9.61)	(9.04)	(8.35)	
α	.89	.77	.89	.60	.79	.90	.89	.86	

need to control thoughts, and cognitive self-consciousness. Finally, higher levels of perceived stress in Time 1 were significantly associated with anxiety symptoms in Time 1 and Time 2.

We investigated the variability between anxiety symptom measures at Time 1 and Time 2 by means of a paired sample t test. Anxiety symptoms demonstrated significant variability between the two measures ($t(118)$ =2.23, p=.02) in the downward direction, indicating that symptom levels decreased between the two waves (M =11.28, SD =8.84 for Time 1; and M =9.89, SD =8.35 for Time 2). However, the Pearson correlation between Time 1 and Time 2 anxiety symptoms was large (see Table 1). Partial correlations between Time 1 metacognitive beliefs and perceived stress with Time 2 anxiety, when the baseline levels of anxiety were controlled for, are also provided in Table 1. As can be seen, when initial levels of anxiety are taken into account, all variables remained significantly associated with anxiety symptoms in Time 2.

4.2. The moderating effect of metacognitive beliefs on the longitudinal link between perceived stress and Time 2 anxiety symptoms

To examine the potential moderating effect of metacognitive beliefs on the relationship between perceived stress and Time 2 levels of anxiety, we conducted a series of hierarchical regression analyses following recommendations by Aiken et al. (1991). For each regression, gender, age, and Time 1 anxiety levels were entered in Step 1 as co-variables. In the second step, we included perceived stress and each of the metacognitive variables (in a separate analysis). Finally, a multiplicative term (also in separate analyses) between each metacognitive variable and perceived stress was entered (scores were mean-centred prior to creating the product term).

In line with results obtained from partial correlations, neither metacognitive belief nor perceived stress predicted Time 2 anxiety when covariables and Time 1 anxiety were controlled for. However, significant interactions were found for negative beliefs (see Table 2). To illustrate and corroborate this interaction, we followed the procedures outlined by Hayes and Matthes (2009). With regard to negative beliefs,

the simple slope of Time 2 anxiety on perceived stress was significantly different from zero at low levels of negative beliefs (β=−.20, p=.04), and marginally significantly at high levels of negative beliefs (β=.20, p=.11). The direction of this interaction indicated that anxiety in Time 2 tends to be higher at high levels of perceived stress only for individuals with higher levels of negative beliefs; however, higher levels of perceived stress predicted low levels of anxiety for people with low negative beliefs. The levels of anxiety did not differ from Time 1 to Time 2 under conditions of low or high-perceived stress if individuals had medium levels of negative beliefs. Interactions are plotted in Fig. 2.

4.3. The moderating effect of metacognitive beliefs on the longitudinal link between baseline levels of anxiety and Time 2 anxiety symptoms

To examine the potential moderating effect of metacognitive beliefs on the relationship between Time 1 and Time 2 levels of anxiety, a series of hierarchical regression analyses were conducted. For our regression equations, gender and age were entered in the first step as co-variables. In the second step, we included Time 1 anxiety levels. In the third step, metacognitive beliefs were included in separate analyses for each variable. Finally, a multiplicative term between each metacognitive variable and Time 1 anxiety was entered, also in separate analyses (scores were mean-centred prior to creating the product term).
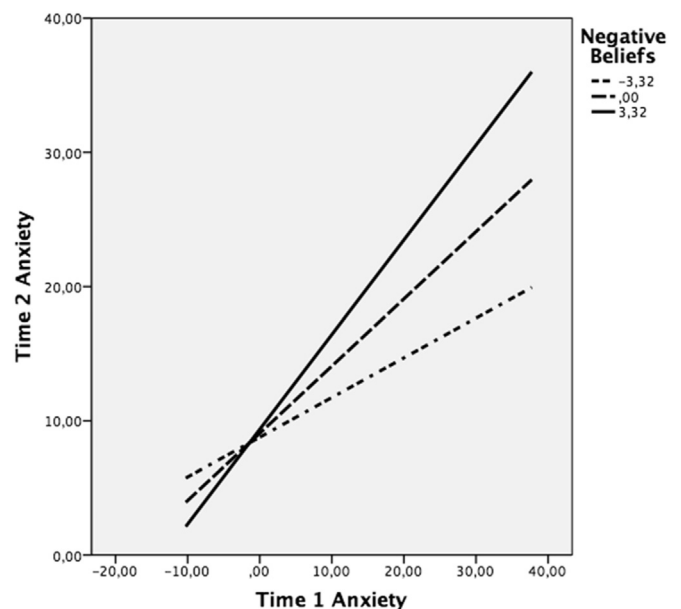
Table 2

Regression results for the moderating effect of metacognitive variables and perceived stress on Time 2 anxiety symptoms after controlling for Time 1 anxiety.

	R^2	F	β
Regression 1			
Step 1	.50	38.01	
Sex			−.03
Age			−.01
Time 1 anxiety			.71**
Step 2	.51	23.19	
Perceived Stress			−.06
Negative Beliefs			.10
Step 3	.53	20.82	
Time 1 anxiety x Negative Beliefs			.17**

Fig. 2. Interactions between metacognitive beliefs and Time 1 anxiety in predicting Time 2 anxiety symptoms.
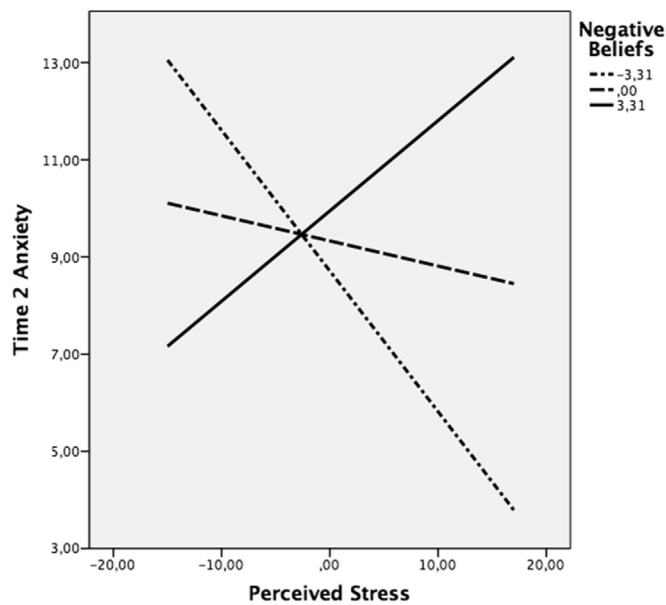
Fig. 1. Interactions between metacognitive beliefs and perceived stress in predicting Time 2 anxiety symptoms.

Table 3
Regression results for the moderating effect of metacognitive beliefs and Time 1 anxiety on Time 2 anxiety symptoms.

	R^2	F	β
Regression 1			
Step 1	.01	.34	
Sex			.08
Age			.01
Step 2	.50	38.01	
Time 1 anxiety			.71**
Step 3	.50	28.85	
Negative Beliefs			.08
Step 4	.56	29.32	
Time 1 anxiety x Negative Beliefs			.30**

In line with results described above, significant interactions were found for negative beliefs (see Table 2). We followed, once again, the procedures outlined by Hayes and Matthes (2009) to corroborate and illustrate the interactions. For negative beliefs, the simple slope of Time 2 anxiety on Time 1 anxiety was significantly different from zero at the three levels of negative beliefs (β=.30, p < .01, for low levels; β=.50, p < .001, for medium levels; β=.70, p < .01, for high levels). The direction of this interaction indicated that Time 2 anxiety tends to be higher as baseline levels of anxiety increase mainly for individuals with higher levels of negative beliefs. These findings are plotted in Fig. 1.(Table 3)

5. Discussion

The S-REF model gives rise to the possibility that metacognitive beliefs can play a causal and maintenance role in emotional issues such anxiety problems (Wells, 1995). For this reason, in this longitudinal study we aimed to analyse the interplay between metacognitive beliefs, stress, and long-term anxiety. In particular, we expected, first, metacognitive beliefs to predict long-term anxiety after a three month period; second, metacognitive beliefs to moderate the stress perceived effect in individuals without emotional disorders; and third, metacognitive beliefs to moderate the effect of previous anxiety level on long-term anxiety, as the model predicts.

First, correlational analysis showed higher levels of metacognitive beliefs are associated with higher levels of anxiety symptoms and perceived stress, as shown by other studies (e.g., Bailey and Wells,

2015; Ruscio and Borkovec, 2004; Spada et al., 2010; Wells and Carter, 2001). Specifically, beliefs about danger and uncontrollability are the most highly associated with higher levels of anxiety symptoms and perceived stress. However, in this study, metacognitive beliefs did not predict long-term anxiety by themselves. This result is contrary to those shown in others studies (Yilmaz et al., 2011) that used the same anxiety measure (BAI) and the same three month period. Although differences between Time 1 and Time 2 anxiety were significant, we found high correlations between them (r =.70). This low variability in comparison with other studies (r =.53; Yilmaz et al., 2011) could help us to explain this finding.

Second, we found anxiety in Time 2 tends to be higher at high levels of perceived stress only for individuals with higher levels of negative metacognitive beliefs, while higher levels of perceived stress predicted low levels of anxiety for people with low negative metacognitive beliefs. In line with others studies (Yilmaz et al., 2011) these findings suggest a moderating effect of metacognitive beliefs on the longitudinal link between perceived stress and Time 2 anxiety symptoms; this result is consistent with another study where metacognitive beliefs play a moderating role in explaining anxiety level (Bailey and Wells, 2015). In individuals with high levels of perceived stress, these will enhance their anxiety level, depending on metacognitive beliefs as the S-REF model predicts (Wells, 2000; Wells and Matthews, 1994).

Third, as we predicted, Time 2 anxiety tends to be higher as baseline levels of anxiety increase, mainly for individuals with higher levels of negative metacognitive beliefs. Of those individuals with previous anxiety levels, those with negative metacognitive beliefs will show higher levels of long-term anxiety.

In sum, although the metacognitive beliefs in our study did not show an independent predictor role on long-term anxiety, negative beliefs do have a causal role which increase the level of anxiety in those individuals with higher previous levels of anxiety and perceived stress. This is consistent with the S-REF model (Wells, 2000) where negative beliefs are activated in response to negative emotions. These beliefs about danger and uncontrollability can play an active role in triggering maladaptive coping and regulation strategies, maintaining emotional distress, increasing the accessibility of negative information through perseverative thinking (e.g., rumination), threat monitoring, avoidance, and thought suppression (Wells, 2000). On the other hand, different metacognitive beliefs may be involved, depending on the nature of stress experienced. In this sense, while cognitive confidence was a moderator when stress referred to daily hassles in college (Yilmaz et al., 2011), negative beliefs emerged as a moderator of live stressful events in our study. Future studies should address which metacognitive beliefs are more relevant in different stressful situations to explain the level of anxiety.

Finally, before our findings can be generalized, it is important to take into account some limitations of the study. First, our sample size was small and mainly consisted of women. Second, a three month period is a modest time period in which to compare Time 1 and Time 2 scores on anxiety and, as we mentioned above, we found high correlations between both measures. Third, instead of focusing on specific disorders, anxiety symptoms alone were assessed with a resulting generalizability issue for clinical samples. Thus, similar prospective designs should be used for testing the effects of metacognitive variables on specific disorders. Fourth, we used self-report measures with consequent limitations. Fifth, other variables can be associated with long-term anxiety, such as neuroticism and other possible outliers. Finally, it is not possible to attribute whole causality, because we did not use an experimental design; more experimental studies are necessary to understand these relationships.

Despite the above limitations, we believe the present findings could provide a step forward in a metacognitive conceptualization of anxiety issues in clinical practice. In particular, the use of metacognitive measures and therapy in individuals with high anxiety levels may help them (1) to deal with their negative emotions reducing their negative

cognitive confidence and acceptance of their feelings, (2) to replace metacognitive beliefs about danger and uncontrollability through training in cognitive restructuring, and (3) to replace maladaptive coping or emotion regulation strategies (i.e., avoidance, cognitive suppression) in order to prevent future relapses. In this study, our results focus on negative metacognitive beliefs as a key tenet relevant to enhancing psychological adjustment in psychological treatment.

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