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The Relative Contribution of Core Cognitive Beliefs and Metacognitive Beliefs to Depression and Behavioral Activation Factors

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Abstract

Cognitive models have been developed to achieve a comprehensive understanding of depression. Whilst the traditional cognitive model is the most widely tested and emphasizes core cognitions, the metacognitive model emphasizes the role of metacognitions. To determine which belief domain is more relevant in the understanding of depression would have theoretical and clinical implications. However, only a few studies have investigated this issue, and no studies have focused on concomitants of depression beyond symptoms. Thus, our aim was to analyse the relative contribution of core cognitive and metacognitive beliefs to depression and its concomitants. Two cross-sectional studies were carried out. Study 1 (N = 701) examined the relative contribution of core cognitive beliefs and metacognitive beliefs to depressive symptoms in a large sample. Study 2 (N = 293) sought to replicate the results focusing not only on depressive symptoms but also on behavioral activation factors. Regression analyses showed that both core cognitive and metacognitive beliefs significantly contributed to depression and behavioral activation. In both studies, core cogn
itive beliefs about disconnection and rejection and negative metacognitive beliefs about social consequences of rumination had unique contributions to depression. Regarding behavioral activation, core cognitive beliefs were consistently associated whereas the contribution from metacognitive beliefs varied: positive metacognitive beliefs added explicative variance to avoidance/rumination, whilst negative metacognitive beliefs about social consequences did so to social impairment. These findings provide additional empirical support for the role of core cognitive beliefs and metacognitions in depression. We discuss clinical implications and future directions.

Keywords Core cognitive beliefs · Metacognitive beliefs · Depression · Behavioral activation

Extended author information available on the last page of the article

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Introduction

Depression is considered one of the principal contributors to incapacity worldwide (Kessler & Bromet, 2013; Mrazek et al., 2014). Likewise, it has been recognized as a prevalent, recurrent, as well as a persistent disorder with elevated socio-economic costs (Beshai et al., 2011; Kessler et al., 2005). Depression interferes with social and interpersonal functioning, aside from causing a decrease in physical activity (Allgöwer et al., 2001; Petty et al., 2004). Thus, most facets of a person's life are pervaded, such as the capacity to function at school, work, or coping with daily life (WHO, 2017). Therefore, efforts to research and examine the risk factors of depression and its underlying mechanisms are imperative.

Cognitive knowledge structures are central to understanding depression and have been derived from two different models emphasizing different belief domains: the cognitive and the metacognitive model. Whereas the cognitive model emphasizes the relevance of core cognitive beliefs (Beck, 1987), understood as dysfunctional pervasive beliefs an individual has about themselves, the world and the future (e.g., "I am a failure"), the metacognitive model focuses on metacognitive beliefs (Wells, 2019), considered as beliefs that individuals have about their own cognitions and mental regulation strategies (e.g., "Ruminating about my problems is uncontrollable"). To determine which belief domains are more relevant in the understanding of symptomatology have the potential to improve conceptualization of depression and subsequent clinical interventions.

The Cognitive Model

The cognitive approach of depression (Beck, 1987; Young, 1999; Young et al., 2003) proposes a hierarchical model including a superficial layer −cognitions− and a deeper underlying layer −core cognitive beliefs− to understand depressive disorders. Core cognitive beliefs are found at the deepest level and are defined as organized structures of stored information that contain relevant individuals' perceptions of self, others, goals, expectations, and memories (Beck & Dozois, 2011; p. 398). These core cognitive beliefs directly impact on individual's feelings, emotions, memories, and cognitive processes, such as guiding perception and giving meaning to experiences regarding the future ("I will never achieve anything"), the world (e.g., "Everyone hates me"), and the self (e.g., "I am worthless") (Will & Sanders, 1997; Young et al., 2003). Core cognitive beliefs are hypothesized to develop mostly in early periods of life, such as childhood and adolescence, although they continue to evolve throughout adulthood.

The cognitive model suggests that core cognitive beliefs are triggered by stressful situations that are consistent with core vulnerability topics, causing negative thoughts and emotions in accordance with the core cognitive beliefs, leading to maladaptive coping strategies that perpetuate them. Thus, when inflexible, core cognitive beliefs are considered central vulnerability elements for the onset of depressive disorders (Clark & Beck, 2010; Dozois & Beck, 2008). Core cognitive beliefs that may involve vulnerability have mainly been measured using two tools. The

Dysfunctional Attitudes Scale (DAS; Weissman, 1979; Weissman & Beck, 1978), which assesses two core cognitive beliefs, "Performance Evaluation" and "Approval by Others", and the Schema Questionnaire (SQ; Young & Brown, 1994), which measures dimensions such as: "Disconnection & Rejection", "Impaired Autonomy & Performance", "Excessive Responsibility & Standards", or "Impaired Limits". While both measures assess core cognitive beliefs such as that happiness depends on being in control (performance) or on other people's acceptance (dependence on approval or rejection), only the SQ include core cognitive beliefs referring to an excessive focus on meeting strict expectations and to deficits in internal limits or long-term goal orientation (Bach et al., 2018) which makes it a more exhaustive measure of cognitive beliefs.

Findings with both instruments indicate that core cognitive beliefs are a relevant variable in depressive symptomatology. Specifically, research using the DAS has found that depression's first-onset, severity, relapse, as well as recurrence of major depression, are predicted by core cognitive beliefs (Alloy et al., 2006; Hankin et al., 2004; Iacoviello et al., 2006; Strujis et al., 2013). Likewise, cross-sectional and longitudinal research using the SQ has found associations between core cognitive beliefs and depressive symptoms in clinical and nonclinical samples, with core cognitions acting as a significant predictor for depression as well as for severity (Hawke & Provencher, 2011). In this line, recent studies have found that two specific dimensions of the SQ are strongly associated to depression (see meta-analytic reviews by Bishop et al., 2022 and Tariq et al., 2021): Disconnection & Rejection, understood as the expectations about one's needs for safety, love, nurturance, or social belonging will not be consistently achieved; and Impaired Autonomy & Performance, which mainly concerns expectations about the inability to function independently in everyday life, achieve success, communicate one's own needs or the dread of being abandoned. On the other hand, existent longitudinal literature has jointly examined the ability of the DAS and the SQ to predict depression in clinical samples over a 9-year interval founding that the SQ, compared to the DAS, seems to be a relatively better vulnerability markers of severity and episodes of mayor depression (Halvorsen et al., 2010; Wang et al., 2010).

The Metacognitive Model

Although the cognitive model has substantial empirical support, its limitations have been described in the metacognitive model, a transdiagnostic approach to psychopathology (Wells, 2019; Wells & Matthews, 1994). In 1994, Wells and Matthews questioned the role of core cognitive beliefs and their content as key in psychopathology. They propose that core beliefs cannot be the factor controlling processing, as individuals can retain flexibility and choice over their cognitive appraisals, being able to decide how to react to thoughts. Thus, cognitive style and the top-down regulation of it, rather than the content of beliefs, is more important for long-term emotional outcomes. From the metacognitive model, there is a particular style of cognition associated with psychopathology named the Cognitive Attentional Syndrome (CAS), which involve a repetitive, persistent, and negative style of thinking that is focused

on self-relevant information (e.g., rumination). The CAS is under the influence of a metacognitive control system (Wells, 2019), and its activation and maintenance are influenced by metacognitive beliefs. Metacognitive beliefs are defined as knowledge about cognition, self-regulation strategies, and mental capabilities. It is held by a metacognitive system that direct and influence the mental regulation strategies and efforts, including regulation and awareness of the current state of cognition, and appraisal of the significance of thought and memories (Wells, 1995, p. 302). From the metacognitive model, these beliefs lead individuals to settle on and maintain the CAS, which in turn exacerbates emotional symptomatology (Wells, 2009).

In compliance with this approach, Papageorgiou and Wells (2003, 2004) developed a specific metacognitive model of rumination and depression. These authors postulated that two metacognitive belief dimensions are crucial in the development and maintenance of depressive disorders. Positive metacognitive beliefs about the usefulness of repetitive ruminative thinking (e.g., "I need to ruminate to find answer to my problems"), and negative metacognitive beliefs about the uncontrollability and danger of rumination (e.g., "Rumination about my problems is uncontrollable") as well as its negative social consequences (e.g., "Everyone would desert me if they knew how much I ruminate about myself"). Individuals that hold positive metacognitive beliefs are prone to trigger rumination (as a form of CAS) in response to negative thoughts, emotions, and stressors. Nevertheless, rumination is a dysfunctional emotion regulation strategy and hence, interferes with successful problem-solving, exacerbating negative affect (Lyubomirsky & Tkach, 2004). Furthermore, the triggering of negative metacognitions leads to the appraisal of the own rumination as uncontrollable as well as potentially threatening, precluding disengagement from the rumination which further maintains depression.

Evidence-based literature has supported the principal claims of the metacognitive model of depression. Thus, one recent meta-analytic review (41 studies, N = 10,607), including cross-sectional and longitudinal designs and non-clinical and clinical samples, has shown that positive metacognitive beliefs are especially associated with rumination ($r = 0.50$) and that negative metacognitive beliefs are especially linked to depression ($r = 0.49$) (Cano-López et al., 2022). Other studies have supported that metacognitive beliefs are predictive factors of psychopathology more generally, not specific to depression (for a meta-analytic review see Sun et al., 2017; see also Wells, 2019).

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In summary, although cognitive and metacognitive approaches consider the importance of higher-order knowledge structures, in the cognitive model these structures consist of beliefs about oneself, others and the world, whereas in the metacognitive model they consist of beliefs about one's own cognition and mental regulation strategies. Both models have obtained empirical support for their main tenets, however, the evidence mainly comes from independent lines of research and, to our

knowledge, only five studies have informed about the relative relevance of core cognitive beliefs and metacognitive beliefs to depressive symptomatology.

Two of the studies used a convenience community sample and assessed depression-specific metacognitive beliefs (Positive and Negative Beliefs about Rumination Scales, PBRS; Papageorgiou & Wells, 2001b; NBRS; Papageorgiou & Wells, 2001a). In 2015, Yilmaz and colleagues found that metacognitive beliefs explained variance in depressive symptoms above and beyond core cognitive beliefs. Specially, the strongest predictor was negative metacognitive beliefs ($\beta = 0.30$) followed by positive ones ($\beta = 0.12$). Nevertheless, after controlling for anxiety and metacognitions, core cognitive beliefs made a significant, although small, independent contribution (R^2 change $= 0.02$, F_{change} [3, 229] $= 2.79$, $p < 0.05$). Huntley and Fisher (2016) sought to replicate these results examining the individual contribution of the two subscales of negative metacognitive beliefs: the uncontrollability and harmfulness of rumination and the social consequences of rumination. They controlled for age, gender, and rumination, and found that core cognitive beliefs and metacognitive beliefs each explained 5% of the explicative variance in depressive symptomatology. Fifty-four % of the variance was explained in the final model, and only core cognitive beliefs as a set as well as the uncontrollability and harm subscale of negative metacognitive beliefs made significant contributions to depressive symptoms, of which metacognitions were the strongest ($\beta = 0.19$ and $\beta = 0.26$, respectively).

Three studies assessed metacognitive beliefs with a general tool (Metacognitions Questionnaire, MCQ-30; Wells & Cartwright-Hatton, 2004). Two of them used clinical samples. Jelinek et al. (2017) examined whether the mechanisms of symptom change in Metacognitive Training for Depression (D-MCT; Jelinek et al., 2015) were cognitive or metacognitive in nature. Their findings showed that the intervention improved both cognitive and metacognitive beliefs, although the effect on change in depressive symptoms was only mediated by a decrease in the need to control thoughts subscale of the MCQ-30. Faissner et al. (2018) analyzed in a 3.5-year longitudinal study the initial level and change in core cognitive and metacognitive beliefs. Using latent growth model analyses they found that baseline scores on negative metacognitive beliefs and need to control thoughts ($\beta = 0.31$ and $\beta = 0.33$) predicted change in depressive symptomatology. Likewise, changes in negative metacognitive beliefs, need to control thoughts, and core cognitive beliefs ($\beta = 0.42$, $\beta = 0.31$, and $\beta = 0.30$) also predicted change in depressive symptoms. Thus, they found that both belief domains were significant predictors. More recently, Strand et al. (2024) found similar results in a prospective study using a within-person approach with a nonclinical sample. Both cognitive and metacognitive beliefs predicted depressive symptomatology over time, but metacognitive beliefs, mainly negative, were more relevant ($\beta = 0.31$ for negative beliefs, $\beta = 0.04$ and $\beta = 0.06$ for Performance Evaluation and Approval by Others core cognitive beliefs, respectively).

Taken together, previous research indicates that both core cognitive beliefs and metacognitive beliefs play a specific role in depression. However, important questions remain regarding the relative contribution of these belief domains. First, studies have relied exclusively on the DAS, assessing limited dimensions of core cognitive beliefs. Second, although existing literature notes that negative metacognitive beliefs assessed with the MCQ-30 seem to be relevant, studies using measures to

assess depression-specific negative metacognitive beliefs, such as the NBRS, are scarcer (Cano-López et al., 2022). Moreover, only one of the studies considered the two dimensions of the NBRS separately (uncontrollability and harmfulness, and the social consequences). Third, even though depression causes significant impairment in physical activity and performance on social and interpersonal fields (Allgöwer et al., 2001; Petty et al., 2004), no studies have analyzed the relative contribution of core cognitive and metacognitive beliefs to behavioral activation and its associated functional impairment. It has been known for several decades that there is a relevant and significant link between depression and behavioral activation (Lewinsohn & Graf, 1973; Gallagher, 1981), findings corroborated by meta-analyses (Cuijpers et al., 2007; Mazzucchelli et al., 2009). Nevertheless, whether core cognitions and/or metacognitions play a role in behavioral activation concomitants associated with depression, such as activation, avoidance, and impairment in work or social settings, remains unexplored.

The Present Research

The goal of the research was to extend the literature on the relative contribution of core cognitive beliefs and metacognitive beliefs to depression. We addressed this issue in two independent studies. In the first study, we used a large sample to analyse the relative contribution of core cognitive and metacognitive beliefs to depressive symptomatology using a comprehensive measure of core cognitive beliefs (assessing different dimensions of cognitive beliefs) and a measure of depression-specific metacognitive beliefs. In a second study, we sought to confirm these relationships by looking at depressive symptoms and to extend them by examining the contribution of cognitive and metacognitive beliefs to behavioral activation and its associated impairment.

Based on the two theoretical frameworks and the existing literature our hypotheses were: First, core cognitive beliefs and metacognitive beliefs will be significantly positively correlated with depression and its concomitants, that is, behavior activation and functional impairment. Second, core cognitive beliefs and metacognitive beliefs will be independently associated to these variables, even when controlling for age, gender, and anxiety symptoms. Since previous literature has shown that: (1) younger adults are more prone to develop mood disorders (Twenge et al., 2019); (2) women score higher in depression (Kessler, 2006); and (3) there is high overlap and comorbidity between anxiety and depression (Cummings et al., 2014), we decided to control the effect of these variables to permit a stringent test of the specific and relative contribution of the belief domains in question to depression and its concomitants.

Study 1

In the first study, we analyzed zero-order Pearson's correlations between core cognitive beliefs, metacognitive beliefs, and depressive symptoms. Next, we analyzed the relative contribution of core cognitive beliefs and metacognitive beliefs

to the aforementioned variables controlling for age, gender, and anxiety symptoms. Regarding core cognitive beliefs, and in concordance with previous research (Bishop et al., 2022 and Tariq et al., 2021), we hypothesized to find that beliefs concerning Disconnection & Rejection and Impaired Autonomy & Performance would show stronger associations with depression in adults. Regarding metacognitive beliefs, we expected negative metacognitive beliefs to have more relevance.

Methods

Participants and Procedure

701 Spanish individuals (60.8% female, 38.9% male, and 0.3% did not report their gender), aged between 18 and 69 years old ($M = 28.03$, $SD = 11.32$) were gathered. Of these, 432 (61.63%) were undergraduate students, whose ages ranged from 18 to 50 ($M = 21.44$, $SD = 5.22$, 66.4% female, 33.3% male, and 0.2% missing value). The remaining 269 (38.37%) participants were non-students, ranging in age from 18 to 69 ($M = 38.62$, $SD = 10.40$, 51.7% female, 48% male, and 0.4% missing value).

Participants were gathered at convenience. Psychology students were verbally informed and compensated with class credit. All other participants were approached using snowball sampling and no compensation was given. Participation was voluntary, anonymous, and confidential. All participants provided informed consent electronically and questionnaires were then administrated and completed individually through the online platform SurveyMonkey. The ethical committee of the Complutense University of Madrid approved this study (Ref. 2017/18–021).

Instruments

Core cognitive beliefs were assessed with the *Schema Questionnaire-Short Form* (SQ-SF; Young & Brown, 1994). The SQ-SF is composed of 75 items (e.g., "I worry that people I feel close to will leave me or abandon me", "I'm unworthy of the love, attention, and respect of others", "I´m incompetent when it comes to achievement") that assess 15 early maladaptive schemas. Participants are asked to answer items that range from 1 ("Completely untrue for me") to 6 ("Describes me perfectly"), with a total score ranging from 75 to 450. The SQ evaluates four higher-order dimensions: (1) Disconnection & Rejection; (2) Impaired Autonomy & Performance; (3) Excessive Responsibility; and (4) Impaired Limits (Bach et al., 2018). The original and the Spanish version have shown good internal consistency, test–retest reliability, and convergent and discriminant validity (Cid & Torrubia, 2002; Schmidt et al., 1995).

Depression-specific positive metacognitive beliefs were assessed with the *Positive Beliefs about Rumination Scale* (PBRS; Papageorgiou & Wells, 2001b). The PBRS is composed of 9 items that measure positive metacognitive beliefs about rumination (e.g., "Rumination about the past helps me work out how things could have been done better"). Respondents indicate the extent to which they agree with each item on a scale ranging from 1 ("Do not agree") to

4 (“Agree very much”). Total score ranges from 9 to 36, higher scores indicate greater endorsement of positive metacognitive beliefs. Original internal consistency and test–retest reliability coefficients were good, 0.89 and 0.85 respectively (Papageorgiou & Wells, 2001b). The Spanish version also has shown good reliability ($\alpha = 0.89$) and validity (Cano-López et al., 2021).

Depression-specific negative metacognitive beliefs were assessed with the *Negative Beliefs about Rumination Scale* (NBRS; Papageorgiou & Wells, 2001a). The NBRS is composed of two subscales that evaluate negative metacognitive beliefs about ruminative thinking: uncontrollability and harmfulness of rumination, that contains 8 items (e.g., “I cannot stop myself from ruminating”, “Ruminating makes me physically ill”); and the social and interpersonal consequences of ruminating, that contains 5 items (e.g., “Only weak people ruminate”). Using a 4-point scale (1 = “Do not agree” to 4 = “Agree very much”) participants state the extent to which they agree on each item, higher scores indicate higher levels of metacognitive beliefs. The validity and reliability of the original NBRS are good (Luminet, 2004; Papageorgiou & Wells, 2001a). We used the Spanish version, which also showed good reliability, $\alpha = 0.82$, and $\alpha = 0.77$ for each subscale respectively (Cano-López et al., 2021).

Depressive symptomatology was assessed with the *Patient Health Questionnaire-9* (PHQ-9; Kroenke et al., 2001). This questionnaire consists of 9 items that assess symptoms of depression during the past two weeks (e.g., “Feeling down, depressed or hopeless”). Items are scored from 0 (“Not at all”) to 3 (“Nearly every day”), with a total score ranging from 0 to 27. Literature has shown adequate psychometric properties and validity for the original and the Spanish version (Diez-Quevedo et al., 2001; Kroenke et al., 2001).

Anxiety symptoms were assessed using the *Patient-Reported Outcomes Measurement Information System; Anxiety domain* (PROMIS-A; Cella et al., 2007). It is an 8-item self-report measure that assesses the severity of anxiety symptomatology (e.g., “I felt fearful”). Participants are asked to rate items from 1 (“Never”) to 5 (“Always”), so the total score range from 8 to 40. The original and the Spanish version have shown good psychometric properties (Cella et al., 2007; Vilagut et al., 2019).

Overview of Data Analytic Approach

We used the Statistical Package IBM SPSS Statistics version 22. We first examined the intercorrelations between key variables through Pearson’s correlation coefficients. Then, we conducted hierarchical linear regression analyses to examine the relative contribution of core cognitive beliefs and metacognitive beliefs to variance in depressive symptoms, whilst controlling demographic variables and anxiety levels. The following strategy was used in the regression models: First, we enter age and gender in step 1; anxiety in step 2; core cognitive beliefs in step 3; and metacognitive beliefs in step 4.

Results

Descriptive Statistics and Correlational Analyses

Means, standard deviations, internal consistency, and zero-order correlation coefficients for all variables are presented in Table 1. Reliability was satisfactory for all scales, ranging from 0.78 to 0.93, and all correlation coefficients were positive and significant.

Results showed that the associations between the four dimensions of core cognitive beliefs and metacognitive beliefs were positive and significant and that negative metacognitions showed a stronger association with core cognitive beliefs than positive ones. Regarding the links between the four dimensions of core cognitive beliefs and depression, all of them were significant; specifically, the Disconnection & Rejection and Impaired Autonomy dimensions showed moderate to strong associations (ranging from $r = 0.55$ to $r = 0.64$). Furthermore, the associations of metacognitive beliefs with depression were also significant, with negative metacognitive beliefs showing stronger correlations than positive metacognitive beliefs. Among the two negative metacognitive belief dimensions, uncontrollability and harm showed the strongest correlations with depression.

Table 1 Means, standard deviations, alpha reliabilities, and inter-correlations among study variables (Study 1; N = 701)

	1	2	3	4	5	6	7	8	9
1. PHQ-9	–								
2. PROMIS-A	.70**	-							
3. Disconnection & Rejection (SQ-SF)	.60**	.46**	–						
4. Impaired Autonomy & Performance (SQ-SF)	.63**	.56**	.79**	–					
5. Excessive Responsibility & Standards (SQ-SF)	.38**	.34**	.46**	.49**	–				
6. Impaired Limits (SQ-SF)	.49**	.38**	.63**	.65**	.38**	–			
7. PBRS	.19**	.24**	.23**	.27**	.22**	.20**	–		
8. Uncontrol. & harm (NBRS)	.51**	.47**	.48**	.53**	.29**	.43**	.10*	–	
9. Social consequences (NBRS)	.48**	.37**	.55**	.57**	.25**	.37**	.10**	.60**	–
M	8.43	3.92	11.34	11.08	16.68	13.88	22.63	16.38	7.03
SD	5.86	8.94	4.51	4.23	4.65	4.67	6.68	5.10	2.74
α	.86	.86	.93	.93	.80	.81	.90	.80	.78

PHQ-9 Patient Health Questionnaire-9, PROMIS-A Patient Reported Outcomes Measurement Information System Anxiety domain, SQ-SF Schema Questionnaire-Short Form, PBRS Positive Beliefs about Rumination Scale, NBRS Negative Beliefs about Rumination Scale

*$p < 0.05$; **$p < 0.01$

Regression Analyses

The full model accounted for 62% of the variance ($R^2 = 0.62$, F [10, 690] = 111.05, $p < 0.001$) (see Table 2). After controlling the overlap between the variables, and looking at the final model, age remained significantly and negatively associated with depression ($\beta = -0.07$, $p < 0.01$) while anxiety was positively and significantly associated ($\beta = 0.46$, $p < 0.001$). Furthermore, Disconnection & Rejection core cognitive dimension ($\beta = 0.20$, $p < 0.001$), and negative metacognitive beliefs

Table 2 The relative contribution of core cognitive and metacognitive beliefs to depressive symptoms (Study 1; N = 701)

		PHQ-9		
		R^2	F	β
Step 1		.06	22.48	
	Age			– .22***
	Gender			– .10**
Step 2		.50	234.08	
	Age			– .10***
	Gender			.00
	PROMIS-A			.68***
Step 3		.61	151.92	
	Age			– .06*
	Gender			– .04
	PROMIS-A			.48***
	Disconnection & Rejection (SQ-SF)			.23***
	Impaired Autonomy & Performance (SQ-SF)			.11*
	Excessive Responsibility & Standards (SQ-SF)			.03
	Impaired Limits (SQ-SF)			.06
Step 4		.62	111.05	
	Age			– .07**
	Gender			– .04
	PROMIS-A			.46***
	Disconnection & Rejection (SQ-SF)			.20***
	Impaired Autonomy & Performance (SQ-SF)			.06
	Excessive Responsibility & Standards (SQ-SF)			.04
	Impaired Limits (SQ-SF)			.06
	PBRS			– .01
	Uncontrol. & harm (NBRS)			.06
	Social consequences (NBRS)			.10**

PHQ-9 Patient Health Questionnaire-9, PROMIS-A Patient Reported Outcomes Measurement Information System Anxiety domain, SQ-SF Schema Questionnaire-Short Form, PBRS Positive Beliefs about Rumination Scale, NBRS Negative Beliefs about Rumination Scale

*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

about the social consequences of rumination ($\beta = 0.10$, $p < 0.01$), showed unique associations with depression.

Summary

The results of this first study highlighted the relevance of both variables –core cognitive beliefs and metacognitive beliefs– in contributing individually to depressive symptomatology, even when controlling for demographic variables and anxiety levels. Looking at the regression analyses, core cognitive beliefs were more strongly associated to depression, while metacognitive beliefs added additional variance. Specifically, and in line with previous studies, Disconnection & Rejection was the only dimension of core cognitive beliefs that shown a unique contribution to depression and, as for metacognition, it was the negative metacognitions about social consequences that had a relative contribution to depression.

Study 2

In Study 2 we aimed to confirm and extend the findings obtained in Study 1 examining the relative contribution of cognitive and metacognitive beliefs to depression and to behavioral activation and its associated impairment. Considering the results of Study 1 and previous research, here we focused in two dimensions of cognitive beliefs: Disconnection & Rejection and Impaired Autonomy & Performance. We first examined the links between core cognitive beliefs, metacognitive beliefs, depressive symptoms and behavioral activation and its impairment associated. Then, we analysed the relative contribution of core cognitive beliefs and metacognitive beliefs to the aforementioned variables controlling for age, gender, and anxiety symptoms.

Methods

Participants and Procedure

293 undergraduate students (80.9% female and 19.1% male), ranging from 18 to 62 years old ($M = 20.20$, $SD = 5.20$), were gathered at convenience during university lessons. They were verbally informed about the study, which was voluntary, anonymous, and confidential. Participants provided informed consent electronically and questionnaires were then administered and completed individually through the same online platform used in Study 1. Those students who participated were compensated with class credit. The ethical committee of the Complutense University of Madrid approved this study (Ref. 2017/18–021).

Instruments

Metacognitive beliefs, depressive symptoms, and anxiety symptoms were measured as in Study 1.

Also as in Study 1, Disconnection & Rejection and Impaired Autonomy & Performance dimensions of core cognitive beliefs were measured using the *Schema Questionnaire-Short Form* (SQ-SF; Young & Brown, 1994). A shortened version of twenty-five items belonging to both dimensions was used, specifically, the early maladaptive schemas assessed were *Mistrust/Abuse, Defectiveness/Shame, Dependence/Incompetence, Abandonment/Instability,* and *Failure*.

Behavioral activation and its associated impairment were assessed with the *Behavioral Activation for Depression Scale* (BADS; Kanter et al., 2007). This is a 25-item questionnaire that measures four dimensions related to depression: Activation (e.g. "I structured my day's activities"), Avoidance/Rumination (e.g., "I tried not to think about certain things"), Work/School Impairment (e.g., "There were certain things I needed to do that I didn't do"), and Social Impairment (e.g., "I was not social, even though I had opportunities to be"). Items on all the scales (except the Activation scale) are reverse-coded and are rated on a 7-point scale that ranges from 0 ("Not at all") to 6 ("Completely"). Previous studies have reported good psychometric properties and validity for both the original and the Spanish versions (Barraca et al., 2011; Kanter et al., 2007).

Overview of Data Analytic Approach

We used the same data analytic software as in Study 1. We first examined the intercorrelations between key variables through Pearson's correlation coefficients. Then, separate linear regressions were conducted for depression symptoms and behavioral factors using the same strategy followed in the Study 1.

Results

Descriptive Statistics and Correlational Analyses

Means, standard deviations, internal consistency, and zero-order correlation coefficients for all variables are presented in Table 3. Reliability ranged from 0.74 to 0.93, being satisfactory for all scales.

Zero-order correlations between the main variables, core cognitive beliefs and metacognitive beliefs, were moderate, positive, and significant (ranging from $r = 0.17$ to $r = 0.59$). Core cognitive beliefs showed strong and moderate associations with depression, and the four dimensions of the BADS. Regarding metacognitive beliefs, results showed moderate, positive, and significant associations with depression, with the two negative metacognitive belief dimensions showing the

Table 3 Means, standard deviations, alpha reliabilities, and inter-correlations among the study variables (Study 2; N = 293)

	1	2	3	4	5	6	7	8	9	10	11
1. PHQ-9	–										
2. PROMIS-A	.76**	–									
3. Activation (BADS)	-.33**	-.23**	–								
4. Avoidance/Rumination (BADS)	.58**	.57**	− .24**	–							
5. Work/School Impairment (BADS)	.55**	.40**	− .52**	.56**	–						
6. Social Impairment (BADS)	.61**	.54**	− .29**	.57**	.46**	–					
7. Disconnection & Rejection (SQ-SF)	.59**	.52**	− .32**	.59**	.50**	.53**	–				
8. Impaired Autonomy & Performance (SQ-SF)	.57**	.55**	− .43**	.55**	.51**	.44**	.72**	–			
9. PBRS	.35**	.34**	− .17**	.39**	.26**	.26**	.35**	.37**	–		
10. Uncontrol. & harm (NBRS)	.51**	.52**	− .28**	.43**	.32**	.36**	.47**	.43**	.26**	–	
11. Social consequences (NBRS)	.53**	.43**	− .30**	.41**	.37**	.45**	.55**	.48**	.21**	.63**	–
M	8.83	20.74	24.42	17.53	12.51	5.61	11.78	12.07	20.70	15.96	6.75
SD	5.76	7.42	9.41	10.96	7.02	6.78	4.88	4.78	6.34	4.92	2.56
α	.86	.93	.74	.87	.77	.88	.88	.91	.90	.80	.79

PHQ-9 Patient Health Questionnaire-9, PROMIS-A Patient Reported Outcomes Measurement Information System Anxiety domain, BADS Behavioral Activation for Depression Scale, SQ-SF Schema Questionnaire-Short Form, PBRS Positive Beliefs about Rumination Scale, NBRS Negative Beliefs about Rumination Scale

** $p < 0.01$

strongest correlations. Likewise, metacognitive beliefs also showed significant low to moderate links to the four dimensions of the BADS.

Regression Analyses

Concerning depressive symptoms, results showed that the full model accounted for the 66% of the variance, ($R^2 = 0.66$, F [8, 284] = 67.60, $p < 0.001$) (see Table 4). After controlling the overlap between the variables, the strongest predictor was anxiety ($\beta = 0.56$, $p \leq 0.001$), followed by the Disconnection & Rejection dimension of core cognitive beliefs and the social consequences of the NBRS ($\beta = 0.15$, $p \leq 0.01$ in both cases). Regarding the BADS, 22% of the variance was accounted by the full model of the Activation dimension ($R^2 = 0.22$, F [8, 283] = 10.07, $p < 0.001$), and after controlling the overlap between variables, only age and Impaired Autonomy & Performance dimension of core cognitive beliefs remained as significant predictors ($\beta = 0.13$, $p \leq 0.05$ and $\beta = -0.38$, $p \leq 0.001$). Regarding the Avoidance/Rumination dimension, the full model accounted for 47% of the explained variance ($R^2 = 0.47$, F [8, 283] = 31.50, $p < 0.001$). After controlling the overlap between variables, anxiety, Disconnection & Rejection dimension of core cognitive beliefs, and the PBRS were significant predictors ($\beta = 0.26$, $\beta = 0.29$, both $p \leq 0.001$ and $\beta = 0.14$, $p \leq 0.01$, respectively). The full model of the Work/School Impairment dimension accounted for 32% of the variance ($R^2 = 0.32$, F [8, 283] = 16.31, $p < 0.001$), and only both dimensions of core cognitive beliefs remained significant, firstly Impaired Autonomy & Performance ($\beta = 0.24$, $p \leq 0.01$) followed by Disconnection & Rejection ($\beta = 0.19$, $p \leq 0.05$). Lastly, 40% of the variance was accounted by the full model of the Social Impairment dimension ($R^2 = 0.40$, F [8, 283] = 25.30, $p < 0.001$), and after controlling the overlap between the variables, anxiety, Disconnection & Rejection dimension of core cognitive beliefs and social consequences of the NBRS remained as significant predictors ($\beta = 0.36$, $\beta = 0.28$, and $\beta = 0.20$, respectively).

Summary

In Study 2 we aimed to confirm and extend the results from Study 1. As in Study 1, results indicated that both Disconnection & Rejection and negative metacognitive beliefs about social consequences were the unique contributors to depressive symptomatology, after controlling for age, gender, and anxiety symptoms. Regarding behavioral factors and its associated impairment, we found that core cognitive beliefs were uniquely correlated with the four dimensions. Regarding the contribution of metacognitive beliefs, positive metacognitions added explanatory variance to the Avoidance/Rumination dimension, whereas negative metacognitions about social consequences did so only to the Social Impairment dimension. In sum, these results indicate that core cognitive beliefs and certain metacognitions are important in their contribution to behavioral activation, its daily consequences, and the impairment caused, broadening the importance of both variables for depression and its repercussions.

Table 4 The relative contribution of core cognitive and metacognitive beliefs to depressive symptoms and behavioral factors (Study 2; N = 293)

		Dimensions of BADS														
		PHQ-9			Activation			Avoidance/ Rumination			Work/School Impairment			Social Impairment		
		R^2	F	β	R^2	F	β	R^2	F	β	R^2	F	β	R^2	F	β
Step 1		.02	3.23		.03	4.82		.02	3.15		.02	2.88		.00	.10	
	Age			− .07			.18**			− .10			− .13*			.00
	Gender			− .13*			− .04			− .10			− .05			− .03
Step 2		.58	134.8		.08	8.71		.33	46.28		.18	20.32		.30	40.62	
	Age			− .03			.17**			− .07			− .10			.03
	Gender			.03			− .08			.01			.03			.08
	PROMIS-A			.77***			− .23***			.56***			.40***			.56***
Step 3		.63	100.0		.20	14.54		.45	46.66		.31	25.58		.38	34.82	
	Age			− .01			.12*			− .04			− .06			.05
	Gender			− .02			− .06			− .05			− .02			.03
	PROMIS-A			.60***			.00			.31***			.13*			.37***
	Disconnection & Rejection (SQ-SF)			.22***			− .02			.33***			.23**			.34***
	Impaired Autonomy & Performance (SQ-SF)			.08			− .41***			.13			.26***			.00
Step 4		.66	67.60		.22	10.07		.47	31.50		.32	16.31		.40	23.50	
	Age			− .02			.13*			− .03			− .07			.05
	Gender			− .02			− .05			− .05			− .03			.03
	PROMIS-A			.56***			.06			.26***			.11			.36***
	Disconnection & Rejection (SQ-SF)			.15**			.04			.29***			.19*			.28***
	Impaired Autonomy & Performance (SQ-SF)			.05			− .38***			.10			.24**			− .02
	PBRS			.05			− .01			.14**			.04			.04

Table 4 (continued)

		Dimensions of BADS			
	PHQ-9	Activation	Avoidance/ Rumination	Work/School Impairment	Social Impairment
Uncontrol. & harm (NBRS)	.03	− .10	.08	.01	− .07
Social consequences (NBRS)	.15**	− .10	.01	.09	.20**

PHQ-9 Patient Health Questionnaire-9, BADS Behavioral Activation for Depression Scale, PROMIS-A Patient Reported Outcomes Measurement Information System Anxiety domain, SQ-SF Schema Questionnaire-Short Form, PBRS Positive Beliefs about Rumination Scale, NBRS Negative Beliefs about Rumination Scale

*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

Table 5 Summary of the main results of regression analyses of Studies 1 and 2

		PHQ-9			
		Study 1 (N = 701)		Study 2 (N = 293)	
Core Cognitive Beliefs					
	Disconnection & Rejection (SQ-SF)	$\beta = .20^{***}$		$\beta = .15^{**}$	
Metacognitive Beliefs					
	Social consequences (NBRS)	$\beta = .10^{**}$		$\beta = .15^{**}$	
		BADS			
		Study 2 (N = 293)			
		Activation	Avoidance/ Rumination	Work/School Impairment	Social Impairment
Core Cognitive Beliefs					
	Disconnection & Rejection (SQ-SF)	$\beta = .20$	$\beta = .29^{***}$	$\beta = .19^{*}$	$\beta = .28^{***}$
	Impaired Autonomy & Performance (SQ-SF)	$\beta = -.38^{***}$		$\beta = .24^{**}$	
Metacognitive Beliefs					
	PBRS		$\beta = .14^{**}$		
	Social consequences (NBRS)				$\beta = .20^{**}$

The beta coefficients are extracted from the last step of the regression analysis shown in Tables 2 and 4, after controlling for age, gender and PROMIS-A in the previous steps. Only statistically significant effects are displayed

PHQ-9 Patient Health Questionnaire-9, BADS Behavioral Activation for Depression Scale, PROMIS-A Patient Reported Outcomes Measurement Information System Anxiety domain, SQ-SF Schema Questionnaire-Short Form, PBRS Positive Beliefs about Rumination Scale, NBRS Negative Beliefs about Rumination Scale

$^{*}p \leq 0.05$; $^{**}p \leq 0.01$; $^{***}p \leq 0.001$

Discussion

The current study aimed to analyze the relative contribution of core cognitive beliefs and metacognitive beliefs to depression and depression-related contaminants in two independent samples. These results help to clarify and improve our understanding of the specific cross-sectional contribution of different belief domains in depression. Regarding our first hypothesis, we found that both core cognitive beliefs and metacognitive beliefs explained independent variance in depression, behavioral activation and its associate impairment (see Table 5 for a summary of the main results of Study 1 and 2). Moreover, in line with our second hypothesis, these associations remained after considering the effect of anxiety (as well as gender and age), which was controlled for comorbidity issues (Cummings et al., 2014) and the strongest contributor to depressive symptoms in our results.

In our two studies we found the same results regarding depressive symptoms, that is, Disconnection & Rejection cognitive beliefs dimension and the negative metacognitive beliefs about the social consequences of rumination had a unique contribution to the symptoms. These findings are consistent with previous literature that has shown relative contributions of both core cognitions and metacognitions to depressive symptomatology (e.g., Faissner et al., 2018; Strand et al., 2024; Yilmaz et al., 2015). We add evidence to this previous research by using a more comprehensive measure of core cognitive beliefs and assessing depression-specific metacognitive beliefs, as well as the two dimensions of the negative metacognitive beliefs. In this line, even when considering a wide range of core cognitive beliefs, negative metacognitive beliefs about the social consequences of rumination had an individual contribution to depression. Previous studies have highlighted the relevance of the social consequences subscales of the NBRS in both non-clinical (Cano-López et al., 2021; Papageorgiou & Wells, 2003) and clinical samples (Roelofs et al., 2010). On the other hand, our finding about the contribution of the Disconnection & Rejection dimension is in line with existing meta-analyses indicating that it is strongly related to depression (Bishop et al., 2022; Tariq et al., 2021).

Of relevance and in addition to previous research, our findings in the Study 2 point out that core cognitive beliefs and metacognitive beliefs are linked with depression concomitants such as behavioral activation and its daily consequences or impairments in everyday life. More specifically, regarding core cognitive beliefs, the Disconnection & Rejection dimension was independently associated with almost all dimensions of the behavioral activation measure (Avoidance/Rumination, Work/School Impairment and Social Impairment) and the Impaired Autonomy & Performance dimension was independently associated with Activation and Work/School Impairment. We also found an additional unique contribution from positive metacognitive beliefs to the Avoidance/Rumination dimension, and negative metacognitive beliefs about the social consequences of rumination to the Social Impairment dimension. The latter observation is in consonance with a study by Bright and colleagues (2018) which reported that negative

metacognitions were unique predictors of interpersonal functioning in individuals with mental risk for psychosis, and with recent evidence showing that change in metacognitive beliefs was associated with improvement in interpersonal problems in a sample of patients with social anxiety disorder under treatment (Strand et al., 2023). Lastly, the association between positive metacognitive beliefs and Avoidance/Rumination is in line with previous results on the link between positive beliefs and rumination (see Cano-López et al., 2022), in this regard, it should be noted that the Avoidance/Rumination dimension of the BADS assesses not only rumination, but also behavioral and cognitive avoidance.

Together, our findings, as well as previous literature, point out that core cognitive beliefs and metacognitive beliefs add independent explanatory variance to depressive symptoms and some dimensions of behavioral activation, which indicate that both beliefs domains are relevant for depression and its concomitants. Likewise, some of the results found in both studies remain in line with the main tenets proposed by the metacognitive model of rumination and depression (Papageorgiou & Wells, 2003, 2004), since positive metacognitive beliefs showed specific contributions to coping strategies such as avoidance/rumination, while negative metacognitions were linked with depressive symptomatology. The metacognitive approach suggest that core cognitive beliefs are influenced by metacognitive beliefs and that core cognitions are more strongly endorsed when symptoms are high and the CAS is active, but that biased metacognition is the mechanism underlying the disorder (Wells, 2019). The cross-sectional nature of our studies does not allow us to analyse this hypothesis, in this sense, further research examining the relationship between these two belief domains, cognitive and metacognitive, is warranted. For example, corroborating through longitudinal studies whether the core cognitive beliefs are an output of metacognitions (as the metacognitive model suggest), or whether there is a bidirectional association between them. In this sense, there is preliminary evidence on the prospective role of change in metacognitions for change in dysfunctional attitudes (Strand et al., 2023). Future studies are also encouraged to examine alternative explanations for our results, such as the influence of third variables, such as for example cognitive control deficits, which have been found to be implicated in difficulties in emotion regulation process of depressed individuals (Joormann & Tanovic, 2011; Salguero et al., 2021).

If core cognitive beliefs and metacognitions are important in depressive symptomatology and its concomitants, then they should be addressed in treatment. From the cognitive approach, the Cognitive Behaviour Therapy (CBT) and the Schema Therapy (ST: Young et al., 2003) are focused on identifying, evaluating, and modifying the content of core cognitive beliefs through cognitive restructuring and behavioral change strategies (Beck & Dozois, 2011). The efficacy of CBT (Cuijpers et al., 2013a; Cuijpers et al., 2019) and the long-term effectiveness of the ST (Basile et al., 2018; Malogiannis et al., 2014) for depression has been established. Our results suggest that, when using CBT or ST to treat depression, the intervention should focus primarily on cognitive beliefs related to concerns about not having one's own needs for safety, love, or social belonging met, which encompass the Disconnection and Rejection dimension. On the other hand, from the metacognitive approach, Metacognitive Therapy (MCT: Wells, 2009) was

specifically developed to modify metacognitions underlying the CAS and does not emphasize changing the content of core cognitive beliefs. MCT has proven to be highly effective for anxiety disorders and depression (Normann & Morina, 2018), even in recurrent and persistent cases of depressive symptoms (Winter et al., 2019). Our results suggest that MCT for depression should emphasize the work on negative metacognitive beliefs, mainly beliefs about the social consequences of rumination.

Although the cognitive and metacognitive theoretical frameworks have been independently investigated, there is some evidence indicating that MCT is associated with improvements in core cognitive beliefs even without addressing them directly. Callesen et al. (2020) found that MCT was equal to CBT in terms of changing core cognitive beliefs assessed with the SQ and superior to CBT in terms of changing core cognitive beliefs assessed with the DAS in individuals with major depressive disorder. Further research examining the role of core cognitive beliefs and metacognitive beliefs as change mechanisms in the treatment of depression is also warranted.

Limitations must be acknowledged to interpret the findings of the current studies. First, the cross-sectional design of the studies precludes drawing conclusion or inferences on cause-effect relationships upon these data. Second, we used mixed sampling methods, gathering participants at convenience as well as through a non-random and uncontrolled snowball procedure, likewise, our sample was composed mainly of females and students. Third, our non-clinical sample prevents the generalization of the results to clinical settings. Finally, limitations about using self-report measures should be considered since one specific issue that remains unresolved in research on core cognitive beliefs and metacognitions is whether behavioral responses to information-processing tasks or implicit tests might be a more sensitive indicator to assess them, as support evidence about laboratory-based cognitive tasks (Adler et al., 2015; Hedlund & Rude, 1995; Rude et al., 2001). Consequently, to be able to attribute causality, longitudinal and experimental designs are needed. In this line, there are precedents about experimental manipulation of meta-emotion beliefs finding evidence for their causal role in emotion regulation based on avoidance (De Castella et al., 2018). Moreover, future studies must corroborate these results in gender-equilibrated samples, in addition to clinical settings.

In conclusion, the present study has strengths that involve important contributions to pre-existing data examining the relative contribution of core cognitive beliefs and metacognitive beliefs to depression. In a cross-sectional design, we found that core cognitive beliefs and metacognitive beliefs are independent contributors to depression and its concomitants. These observations stress the importance of further investigation with longitudinal and experimental designs to examine the dynamic relationships between these belief domains and their role in the prevention and improvement of depression.

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Availability of Data Data available on request from the authors.

Declarations

Conflict interests The authors declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

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