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Testing the impaired disengagement hypothesis: The role of attentional control and positive metacognitive beliefs in depression

José M. Salguero [a,*], Juan Ramos-Cejudo [b], Esperanza García-Sancho [c], Ilyana Arbulu [d], José L. Zaccagnini [e], Johan Bjureberg [f], James J. Gross [f]

[a] Department of Personality, Evaluation and Psychological Treatment, University of Malaga, Spain
[b] Department of Psychology, Camilo Jose Cela University, Spain
[c] Department of Psychology, University of Cordoba, Spain
[d] Department of Personality, Evaluation and Psychological Treatment, Complutense University of Madrid, Spain
[e] Department of Experimental Psychology, University of Malaga, Spain
[f] Department of Psychology, Stanford University, USA

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ABSTRACT

The impaired disengagement hypothesis holds that people ruminate – and thus increase their risk for depression – due to impaired attentional control and conflict signaling. We tested this hypothesis by examining the role of attentional control and conflict signaling (operationalized as positive metacognitive beliefs) in rumination and depressive symptoms. We expected that attentional control and positive metacognitive beliefs would be associated with depressive symptoms and that these associations would be cross-sectionally mediated by rumination. We tested two community samples (Study 1, N = 289; Study 2, N = 292), assessing attentional control, positive metacognitive beliefs, rumination, and depressive symptoms. In both studies, attentional control and positive metacognitive beliefs were significantly associated with rumination and depression, and path analyses corroborated the proposed mediation model. Our findings support the impaired disengagement hypothesis, and suggest that attentional control and positive metacognitive beliefs may be informative in the personalization of depression assessment and treatment.

1. Introduction

Depression is one of the most prevalent psychological disorders in the general population (Kessler et al., 2005). Although empirically supported interventions for depression are available (e.g., cognitive-behavioral therapy or interpersonal psychotherapy; for a review see Cuijpers et al., 2011), several challenges remain, such as a high percentage of people who do not respond sufficiently to the treatment, as well as high relapse and recurrence rates (Norton & Price, 2007). It has been suggested that current treatments do not focus enough on key underlying vulnerability factors of depression, causing this disorder to not completely remit or, when remitted, to remain as a risk factor for new onsets (Koster et al., 2017). Thus, efforts to identify underlying mechanisms of depression are urgently needed.

One underlying mechanism is thought to be depressive rumination (Nolen-Hoeksema et al., 2008; Papageorgiou & Wells, 2004). Depressive rumination is a maladaptive emotion regulation strategy defined as repetitive thinking that focuses an individual's attention on their depressive symptoms and the implications, causes, and meanings of these symptoms (Nolen-Hoeksema et al., 2008). The response style theory of depression (Nolen-Hoeksema, 1991) proposes that rumination is a trait-like response to negative affect. There is evidence from several studies showing that trait rumination plays a causal role in the development and maintenance of depression (for a review see Nolen-Hoeksema et al., 2008; Watkins & Roberts, 2020). However, it is not clear why people use this maladaptive strategy.

2. The impaired disengagement hypothesis

Koster et al. (2011) proposed the impaired disengagement hypothesis as a framework to account for the heightened levels of rumination observed in depression. The core idea is that individuals who ruminate

* Corresponding author. Department of Personality, Evaluation and Psychological Treatment, School of Psychology. University of Málaga, Campus de Teatinos s/n.29071. Malaga. Spain.
E-mail address: jmsalguero@uma.es (J.M. Salguero).

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have difficulties in effectively disengaging from negative thoughts and emotions. In particular, the impaired disengagement hypothesis proposes two barriers to effective disengagement: impaired attentional control and impaired conflict signaling.

First, the inability to override or inhibit mood-congruent items from working memory is thought to explain the proliferation of negative information in working memory, directly linking attentional control impairments to rumination (Koster et al., 2017). Several studies have found evidence for the link between attentional control and rumination using both performance and self-report measures of attentional control.

Focused on performance measures, two meta-analyses have synthetized relevant research. Yang et al. (2016) analyzed the results of 34 studies (N = 3066) and found significant negative associations between rumination and two different aspects of attentional control, inhibition (r = −0.23, 95% CI [-0.31, −0.15]) and shifting (r = −0.19, [-0.32, −0.05]). These associations were not moderated by age, sex, type of sample (depressed or healthy), or type of content stimuli (affective vs. neutral). More recently, Zetsche et al. (2018), synthesized findings from 94 studies that examined the association between different forms of repetitive negative thinking (i.e., worry and rumination) and deficits in cognitive control, finding that rumination was negatively associated with the ability to discard no longer relevant material from working memory (r = −0.20, [-0.26, −0.13]). Again, this result remained significant after controlling for different moderators (i.e., levels of psychopathology or stimuli valence). It is noteworthy that, while the framework by Koster et al. (2011) focused on impaired attentional control to inhibit affective information, recent evidence shows that both general (neutral) and specific (affective) impairments are associated to rumination (Yang et al., 2016; Zetsche et al., 2018).

Other studies have found similar results using self-report measures of attentional control (Cox et al., 2016; DeJong et al., 2019; Mills et al., 2016). Moreover, attentional control is associated with depression (Snyder, 2013; Snyder et al., 2015) and a few studies have explored the interplay between attentional control, rumination and depression, showing evidence that an attentional control deficit relates with depressive symptoms through rumination (Demeyer et al., 2012; Hsu et al., 2015; Kertz et al., 2017).

Second, the impaired disengagement hypothesis suggests that individuals do not disengage from negative thoughts (and negative affect) because these negative states elicit less signaling of cognitive conflict. Therefore, attention resources (although intact) may deliberately not be reallocated because individuals do not believe that rumination conflicts with their goals. One variable that may be responsible for this impaired conflict signaling is positive metacognitive beliefs (Van den Bergh et al., 2018; Wells, 2009).

In particular, Wells (2009; 2019) has suggested that the activation and maintenance of maladaptive emotion regulation strategies involving perseverative thinking (e.g., rumination) is dependent on stable beliefs people have about their cognitive system and coping strategies, called metacognitive beliefs. These metacognitive beliefs guide people to select and continue using perseverative thinking, which in turn increases and maintains emotional distress (Wells, 2000). Especially relevant to the activation of rumination are positive beliefs about rumination (e.g., “Rumination helps me cope”). People having positive beliefs are more prone to using rumination as a “useful” strategy to regulate their negative affect (Wells, 2009). In this sense, positive metacognitions might activate deliberate efforts to direct the focus of attention inward, impairing the conflict signaling, leading to rumination. There is research indicating that positive beliefs are related to higher levels of rumination in both cross-sectional and prospective studies (Kraft et al., 2019; Kubiak et al., 2014; Weber & Exner, 2013), and there is evidence that rumination mediates the association between positive metacognitive beliefs and depression (Cano-López et al., 2020; Papageorgiou and Wells, 2001).

As reviewed above, separate lines of research have found evidence for the associations between attentional control, on one hand, and positive metacognitive beliefs, on the other hand, with rumination and depression. However, to our knowledge, no studies have examined these variables jointly, testing whether attentional control and positive metacognitive beliefs have unique contributions to the mediating role of rumination on depressive symptoms. This is a key gap in the literature because different interventions have been designed to specifically target attentional control (e.g., Cognitive Control Training; see Koster et al., 2017 for a review) and metacognitive beliefs (e.g., Metacognitive Therapy; Wells, 2009). If attentional control and positive metacognitive beliefs play specific and independent roles in rumination and depressive symptoms, these constructs may be relevant to personalization of treatment (i.e., by choosing intervention guided by the particular difficulties of the patients).

3. The present research

In this work, we aimed to test the impaired disengagement hypothesis by examining the role of attention control and positive metacognitive beliefs in rumination and depressive symptoms. We tested a mediation model in which attentional control and positive beliefs have a direct (and independent) effect on rumination and an indirect effect on depressive symptoms (through rumination). According to the impaired disengagement hypothesis, and to the metacognitive model, people ruminate (and thus increase their depressive symptoms) due to impaired attentional control and positive metacognitive beliefs; therefore, we considered rumination as the mediator in our model. We examined this model in two separate community samples. Because some authors have suggested the need to control for anhedonia levels when examining the effect of cognitive control performance in rumination and depression, since high level of anhedonia might account for the impaired effort to allocate attention in behavioral tasks (see Grahek et al., 2019), we controlled for anhedonia; also, we controlled for sex and age. We hypothesized that (1) attentional control and positive metacognitive beliefs would have a specific contribution to rumination; (2) attentional control and positive metacognitive beliefs would be associated with depression; and (3) rumination would mediate the associations between attentional control/positive metacognitive beliefs and depressive symptoms.

Finally, although Koster et al. (2011) hypothesized that prolonged use of rumination is the result of either impaired conflict signaling *or* attentional control, recent evidence suggest that metacognitive beliefs and attentional control may interact when accounting for anxiety and depressive symptoms (Reinholdt-Dunne et al., 2019). Thus, in addition to testing the mediation model, we examined an alternative model considering the interaction effects of attentional control and positive metacognitive beliefs to account for rumination and depression.

4. Study 1

In Study 1, we first examined the associations between attention control performance, positive metacognitive beliefs, rumination, and depression, controlling for anhedonia levels, in addition to sex and age. Next, we tested the mediation model using path analysis. Finally, we tested the model including the interactions effects of positive metacognitions and attentional control.

4.1. Method

4.1.1. Participants and procedure

As part of a larger study, 289 individuals (78.2% female, 20.8% male, and 1% missing value) ranging in age from 18 to 70 years (M = 24.56, SD = 11.37) were recruited. Of these, 171 were undergraduates (ages ranged from 18 to 54 years, M = 19.9, SD = 3.5; 83% female, 15.8% male, and 1.2% missing value) and 118 were non-students from the general population (ages ranged from 18 to 70 years, M = 31.36, SD = 14.9; 71.2% female, 28% male, and 0.8% missing value). In the

student sample, 5.1% had a previous university degree and 0.6% had a postgraduate level degree; in terms of economic status, 25.4% reported annual income less than €12.000, 42.4% between €12.000 and 24.000, 19.8% between €24.000 and 36.000 and 12.4% more than €36.000. In the non-student sample, 61.6% had completed secondary education, 23.2% had a university degree and 2.7% a postgraduate level degree. In terms of economic status, 7.1% reported annual income less than €12.000, 40.42% between €12.000 and 24.000, 28.6% between €24.000 and 36.000 and 24.4% more than €36.000.

Student participants were verbally informed about the study during university courses, and were compensated with class credit for their participation. Non-student participants were approached using a snowball procedure (student participants recruited non-student participants), and no compensation was given to them. Once participants agreed to be involved, they were invited to: 1) complete informed consent and questionnaires electronically, with instructions given in writing, 2) complete a laboratory session where an attentional control task was administered. Participants entered the laboratory in small groups (4–6 participants) and received instructions, then performed the task in a semi-isolated cubicle using an IBM-compatible PC. Each computer was equipped with software programmed in E-Prime 3.0 (Psychology Software Tools, USA). Participation was voluntary and anonymous. The study obtained ethical approval from the Complutense University of Madrid (Ref.: 2017/18–021).

4.1.2. Measures

Attentional Control. The Color-Word Interference Stroop Task (Stroop, 1935) was administered to measure attentional control. The Stroop effect has been accounted for by interference between different stimulus attributes such as ink color and semantic meaning and it is widely used in the depression literature (Snyder, 2013) to measure attentional processes related to rumination. We used an inhibition variant of the test where participants are asked to name the printed color of color-word names, requiring them to inhibit the pre-potent reading response of the word in incongruent color-word stimulus (Denney & Lynch, 2009; McRae et al., 2012; Zalonis et al., 2009). Participants completed a total of 90 trials. Each trial started with the presentation of a brief fixation cross that lasted 100 ms. The target stimulus then appeared, presented on the screen until a response was given. Stimuli consisted of a color name (blue, green or red) written in either blue, green or red. To reduce the time of completion, we used a version of the task where all trials were incongruent, depicting the name of the color written in a color that did not match it (e.g., the word "red" written in blue). Numbers of presentations of each color name and word color were balanced. After giving a response, the next trial started immediately. Participants were instructed to respond as quickly and accurately as possible to the color in which the word was written by pressing the keys 1, 2 or 3 (red was assigned to '1', blue to '2' and green '3'). To ensure that participants remembered the color associated with each key, they were marked with colored stickers. Following McRae et al. (2012) scoring, we eliminated trials with reaction times lower than 200 ms, and replaced those greater than 2000 ms with 2000 ms. As the Stroop effect is a measure of interference, it was calculated based on accuracy and speed (i.e., reaction time) in incongruent color-word stimulus (e.g., Zalonis et al., 2009). We therefore used an overall measure of the performance on the task, which combine standardized accuracy and speed scores (using the formula: Z(accuracy)-Z(reaction time); see Chignell et al., 2014, for more details). For this overall measure, higher values indicate poorer performance and, thus, higher difficulties in inhibition capacity.

Positive Beliefs about Rumination Scale (PBRS; Papageorgiou & Wells, 2001). The PBRS is a 9-item self-report scale that assesses positive metacognitive beliefs about rumination (e.g., "Ruminating about the past helps me to prevent future mistakes and failures"). Respondents are asked to indicate the extent to which they agree with each item on a 4-Likert scale ranging between 1 = "Do not agree" and 4 = "Agree very much". The total score ranges from 9 to 36, with higher scores indicating greater conviction in positive metacognitive beliefs. Both the original version and the Spanish version we used have shown good reliability and validity (Cano-López et al., 2020; Papageorgiou & Wells, 2001).

Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001). This nine-item self-report scale assesses symptoms of depression with a two-week recall period (e.g., "Feeling down, depressed or hopeless"). Items are rated on a scale from 0 = "Not at all" to 3 = "Nearly every day", with total scores ranging from 0 to 27. Both the original version and the Spanish version we used have shown good reliability and validity (Diez-Quevedo et al., 2001; Kroenke et al., 2001).

Ruminative Response Scale; Brooding Subscale (RRS; Nolen-Hoeksema & Morrow, 1991). The RRS assesses individuals' tendencies to ruminate in response to sadness or depressed mood. In the current study we only used the brooding subscale, which is the scale that has been primarily linked to depressive symptoms (e.g., "Think about a recent situation, wishing it had gone better"), comprising 5 items. Responses range from 1 = "Almost never" to 4 = "Almost always", and brooding total score range from 5 to 20. Both original and Spanish versions have shown that RRS is a reliable and valid measure (Hervás, 2008; Luminet, 2004).

Snaith-Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995). The SHAPS is a 14-item self-report scale of anhedonia. Participants rate how much pleasure they would receive from various activities in the last few days (e.g., "I would find pleasure in my hobbies and pastimes") on a 4-point scale, 1 = "Strongly agree", 2 = "Agree", 3 = "Disagree", 4 = "Strongly disagree". We followed recommendations of Snaith et al. (1995) and used a simpler method of scoring in which either of the "Disagree" responses were scored as 1 and any of the "Agree" responses were scored as 0. Thus, the total score ranges from 0 to 14, with higher scores indicating increased levels of anhedonia. Both the original and Spanish versions of the SHAPS has good psychometric properties (Fresán & Berlanga, 2013).

4.1.3. Data analytic approach

We used IBM SPSS (Version 22) for computing descriptive statistics, correlation analyses, and internal consistency (Cronbach's alpha), and EQS (Version 6.3; Bentler, 1995) to compute path analyses. We carried out path analyses using the maximum likelihood (ML) method. In the model, positive metacognitive beliefs and impaired attentional control were entered as predictors, depressive symptoms as the outcome variable, and rumination as mediator. We also tested the model controlling for anhedonia, sex and age. We calculated direct effects of positive metacognitive beliefs and impaired attentional control on rumination (*a* path) and depression (*c* path), direct effect of rumination on depression (*b* path) and indirect effects of positive metacognitive beliefs and impaired attentional control through rumination (*ab* path). We also calculated the proportion of the total effect that was accounted for by the mediator, using the formula *ab/c* (Preacher & Kelley, 2011). To examine the potential interaction effect of attentional control and positive metacognitive beliefs to account for rumination and depression, we tested the mediation model including the interaction term between positive metacognitive beliefs and attentional control, and then comparing model fit for this model with the model without the interaction term.

According to Schweizer's (2010) recommendations, in addition to chi square, several measures of model fit were used: (a) root mean square error of approximation (RMSEA); (b) the Bentler Comparative Fit Index (CFI), and (c) standardized root mean square residual (SRMR). For the CFI, values exceeding 0.90 signify acceptable fit. For the RMSEA, values below 0.05 are indicative of good fit. Finally, values of the SRMR are expected to stay below 0.10 (Schweizer, 2010) to indicate good fit.

4.2. Results and discussion

4.2.1. Descriptive statistics and correlations

Descriptive statistics, reliabilities, and zero-order correlation

coefficients for all the study variables in Study 1 are shown in Table 1. We found positive and significant correlations in the expected direction between all the variables of interest, indicating that people with impaired attentional control and higher levels of positive metacognitive beliefs about rumination showed higher levels of rumination, depressive symptoms, and anhedonia. Impaired attentional control and positive metacognitive beliefs were also statistically significantly correlated, although this correlation was weak. To examine whether the association between impaired attentional control and rumination and depressive symptoms would be accounted for anhedonia levels, we performed partial correlations. We found that these associations remained significant ($r = 0.18$; $p = .003$, for rumination; and $r = 0.14$; $p = .014$, for depressive symptoms).

4.2.2. Path analysis

We tested the proposed mediation model, which showed the following fit indices, $\chi2 = 2.08$, df = 1, $p = .14$; RMSEA = 0.06, 90% CI [0.01–0.18]; CFI = 0.99; SRMR = 0.02. Globally, these indices indicate a good fit to the data. As presented in Fig. 1, impaired attentional control and positive metacognitive beliefs were both positively and significantly related to rumination. We also found that rumination had a significant direct effect on depression symptomatology. Whereas positive beliefs were related to depressive symptoms directly and indirectly (through rumination, $b = 0.23$, 95% CI [0.16–0.30], $SE = 03$, p < .01), impaired attention control was only indirectly related to depressive symptoms ($b = 0.07$, 95% CI [0.02–0.12] $SE = 0.12$, p < .01). Thus, the mediating effect of rumination was total for impaired attention control and partial for positive metacognitive beliefs (with a proportion mediated effect of 0.55). We also performed a path analysis controlling for the effects of anhedonia. Results did not change substantially: $\chi2 = 0.97$, df = 1, $p = .32$; RMSEA = 0.01 [0.01–0.15]; CFI = 1.00; SRMR = 0.01. Impaired attentional control was linked to rumination (b = 0.13, $SE = 0.15$, p < .05) and indirectly related to depression (b = 0.05, $SE = 0.10$, p < .05), but not directly. Similar results were found when we controlled for sex and age: $\chi2 = 0.78$, df = 1, $p = .38$; RMSEA = 0.01 [0.01–0.15]; CFI = 1.00; SRMR = 0.01. Finally, we tested the model including the interaction effects between attentional control and positive metacognitive beliefs, but indices showed a poorer fit to the data compared to the model without the interaction term: $\chi2 = 13.23$, df = 3, $p = .004$; RMSEA = 0.11 [0.05–0.17]; CFI = 0.96; SRMR = 0.54.

4.2.3. Summary

The results of this first study are in line with the main tenets of the impaired disengagement hypothesis. That is, attentional control and positive metacognitive beliefs are linked to rumination, which mediates the association between them and depressive symptoms. Importantly, these associations remained significant after controlling for anhedonia levels. According to the impaired disengagement hypothesis, the inability to inhibit the processing of information that is not relevant (i.e., negative thoughts or affect) could explain the proliferation of negative information typical in rumination (Koster et al., 2011). Our results points in this direction and are consistent with previous research that has found that inhibition is related to both rumination and depression (Joormann, 2010; Snyder, 2013; Yang et al., 2016). In addition, participants with positive beliefs about rumination showed higher levels of rumination and depression. This result is consistent with previous research (Papageorgiou & Wells, 2003; Roelofs et al., 2010; Weber & Exner, 2013) and with the metacognitive model, and suggests that people holding the belief that rumination is a useful strategy are more prone to engage in rumination as a way to regulate their negative affect, which may maintain and enhance their depressive symptoms.

Table 1
Means, standard deviations, internal reliabilities, and correlations among variables of interest in Study 1 (N = 289).

	1	2	3	4	5
1. Impaired Attentional Control (Stroop Task)	–				
2. Positive metacognitive beliefs (PBRS)	.12*	–			
3. Rumination (RRS)	.20**	.51**	–		
4. Depressive symptoms (PHQ-9)	.19**	.44**	.59**	–	
5. Anhedonia (SHAPS)	.13*	.19**	.28**	.47**	–
M	−0.31	21.85	12.52	8.53	1.20
SD	1.28	6.41	3.78	6.12	1.83
α	–	.89	.79	.87	.73

Note. *p < .05; **p < .0\1.

5. Study 2

In Study 2, we sought to replicate the results of Study 1, this time assessing attention control via self-report. We also used different measures of rumination and depressive symptoms, and assessed two different facets of self-reported attentional control: focusing and shifting. Focusing is related to inhibition and refers to the ability to maintain attention, mainly in the face of distraction (e.g., "I find it difficult to concentrate myself when I am excited"). Shifting refers to the ability to direct attention flexibly, and to move it between different tasks or stimuli (e.g., "I can quickly switch from one task to another"). Previous research has found that focusing and shifting are negatively related with rumination and depression (Cox et al., 2016; DeJong et al., 2019; Ólafsson et al., 2011; Yang et al., 216) and that the association between self-reported attentional control and depression is mediated by rumination (Hsu et al., 2015). However, no studies have tested the role of self-reported attentional control and positive metacognitive beliefs in rumination and depression, and examining these variables in the same model in the light of the impaired disengagement hypothesis. As in Study 1, we first examined the associations between key variables. We then tested the mediation model using path analysis (controlling for age and sex). Finally, we tested the mediation model including the interaction term between positive metacognitive beliefs and attentional control.

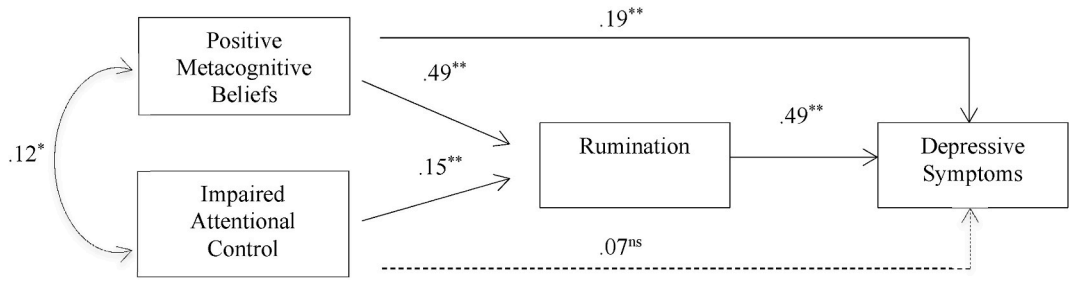
5.1. Method

5.1.1. Participants and procedure

As part of a larger project, 292 undergraduate students (80.8% female, 19.2% male) ranging in age from 18 to 62 years ($M = 20.19$, $SD = 5.19$) were recruited. Of these, 5.7% had previous university degree and 0.9% a postgraduate level degree. In terms of economic status, 17.8% reported annual income less than €12.000, 44.4% between €12.000 and 24.000, 22% between €24.000 and 36.000 and 14.8% more than €36.000. Participants were verbally informed about the study during the university lectures, and were compensated with class credit for their participation. They were instructed to complete informed consent and questionnaires electronically and individually, with instructions given in writing. Participation was voluntary and anonymous. Ethical approval was obtained from the Complutense University of Madrid (Ref.: 2017/18–021).

5.1.2. Measures

Attentional Control Scale –Short Form (ACS-S, Judah et al., 2014). The ACS-S is a 12-item self-report measure that is a shortened version of the *Attentional Control Scale* (ACS; Derryberry & Reed, 2002). The ACS-S consists of two subscales that assess two aspects of attentional control: focusing (7 items) (e.g., "When I need to concentrate and solve a problem, I have trouble focusing my attention") and shifting (5 items) (e.g., "It is easy for me to alternate between two different tasks"). Items are rated on a 4-point Likert-type scale (1 = Almost never to 4 = Always), with scores ranging from 7 to 28 for the focusing subscales, and from 5 to 20 for the shifting subscale. Higher scores indicate a greater capacity to regulate attention. The ACS-S has demonstrated adequate



Note. Dashed paths represent non-significant associations. Standardized beta coefficients are shown.
*p < .05; **p < .01

Fig. 1. Path Analysis Testing the Impaired Disengagement Hypothesis in Study 1
Note. Dashed paths represent non-significant associations. Standardized beta coefficients are shown.
*p < .05; **p < .01.

psychometric properties (Judah et al., 2014).

Positive Beliefs about Rumination Scale (PBRS; Papageorgiou & Wells, 2001). We used the PBRS described above in Study 1.

Rumination-Reflection Questionnaire; Rumination Subscale (RRQ; Trapnell & Campbell, 1999). This questionnaire assesses, regardless of affective state, the tendency to use rumination and reflection about past events. In this study we only used the rumination subscale (e.g., "I spend a great deal of time thinking back over my embarrassing or disappointing moments"), with 12 items. Items are rated on a 5-point Likert scale ranging between 1 = "Strongly disagree" and 5 = "Strongly agree", the total score range from 12 to 60. The original study showed good internal consistency for both scales. We used a Spanish version of the RRQ (see Pena & Losada, 2017), which has shown adequate psychometric properties.

Patient-Reported Outcomes Measurement Information System Depression domain (PROMIS-D; Cella et al., 2007). This eight-item measure assesses the severity of depressive symptoms (e.g., "I felt that I have nothing to look forward to"). Responses range from 1 = "Never" to 5 = "Always", thus the total score vary from 8 to 40. Findings showed good psychometric properties and validity in both the original and the Spanish version of PROMIS-D (Cella et al., 2007; Vilagut et al., 2019).

5.2. Results and discussion

5.2.1. Data analytic approach

We followed the same analytic approach described in Study 1.

5.2.2. Descriptive statistics and correlations

Descriptive statistics, reliabilities, and zero-order correlation coefficients for all the study variables in Study 2 are shown in Table 2. Results of Study 2 corroborated those obtained in the Study 1. We found that focusing and shifting were negatively correlated with rumination and depression symptoms. It is noteworthy that the magnitude of the correlations were higher for focusing than for shifting. Positive beliefs about rumination were positively and significantly correlated with rumination and depressive symptoms, and significant positive associations were found between rumination and depressive symptoms. Our results also revealed different associations between the specific facets of attentional control and the positive metacognitive beliefs, with focusing being negatively and significantly related to positive beliefs, whereas no significant relations were found for shifting.

Table 2
Means, standard deviations, reliabilities, and correlations among variables of interest in Study 2 (N = 292).

	1	2	3	4	5
1. Focusing (ACC-S)	–				
2. Shifting (ACC-S)	.37**	–			
3. Positive metacognitive beliefs (PBRS)	-.26**	-.03	–		
4. Rumination (RRQ)	-.31**	-.12*	.49**	–	
5. Depressive symptoms (PROMIS)	-.39**	-.23**	.34**	.54**	–
M	17.39	12.75	20.74	17.03	37.92
SD	4.45	2.68	6.33	8.02	7.45
α	.81	.68	.90	.90	.95

Note. *p < .05; **p < .01.

5.2.3. Path analysis

We tested the same model proposed in the Study 1, this time with focusing and shifting. The model showed the following fit indices, $\chi 2 = 2.45$, df = 3, p = .48; RMSEA = 0.01, 90% CI [0.01–0.09]; CFI = 1.00; SRMR = 0.01. Globally, these indices indicate a good fit to the data. As presented in Fig. 2, positive metacognitive beliefs and focusing were correlated, as were focusing and shifting, but not metacognitive beliefs and shifting ($b = -0.3$, $SE = 1.00$, p > .05). Positive beliefs about rumination and focusing had a specific effect on rumination, whereas shifting was directly related with depressive symptoms, but not with rumination. We also found that rumination had a significant direct effect on depression symptoms. Whereas focusing was significantly related to depressive symptoms directly and indirectly (through rumination, $b = -0.8$, 95% CI [-0.13 to −0.03], $SE = 0.5$, p < .01), positive metacognitive beliefs were indirectly related to depressive symptoms ($b = 0.18$, 95% CI [0.12–0.25], $SE = 0.4$, p < .01). Thus, in Study 2, the mediational effect of rumination was total for positive metacognitive beliefs and partial for focusing (with a proportion mediated effect of 0.29). Similar results were found when sex and age were controlled for: $\chi 2 = 1{,}92$, df = 3, $p = .59$; RMSEA = 0.01 [0.01–0.08]; CFI = 1.00; SRMR = 0.01. We finally tested the mediation model including the interaction effect between self-reported attentional control and positive metacognitive beliefs; indices showed a poorer fit to the data: $\chi 2 = 129.29$, df = 9, $p = .001$; RMSEA = 0.21 [0.18–0.25]; CFI = 0.63; SRMR = 0.12.

5.2.4. Summary

The results in Study 2 partially replicated those of Study 1, despite using different measures of attentional control, rumination, and depression. Two facets of attentional control – focusing and shifting – were negatively related with rumination and depression. This result suggests that people who perceive themselves as having more ability to implement attentional control, that is, to focus their attention and concentrate in the face of distraction and to shift their attention flexibly, also report less frequent use of rumination and lower levels of depression symptoms. On the other hand, consistent with the results of Study 1 and with the metacognitive model, participants holding positive

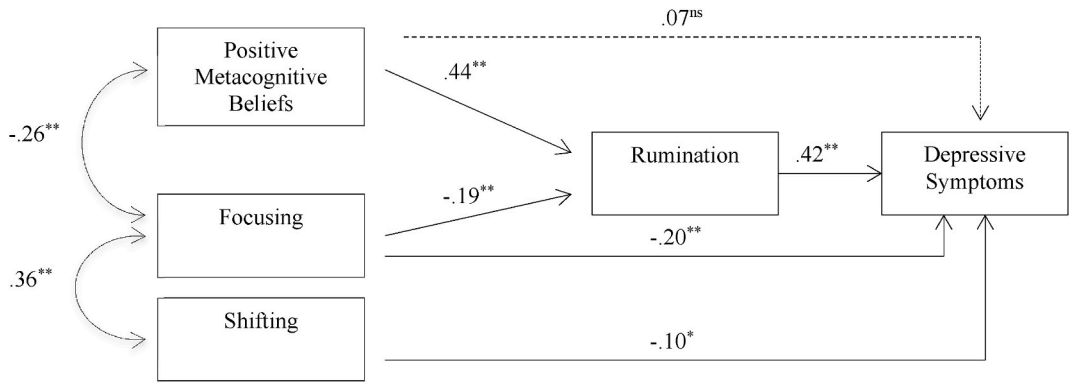


Fig. 2. Path Analysis Testing the Impaired Disengagement Hypothesis in Study 2
Note. Dashed paths represent non-significant associations. Standardized beta coefficients are shown.
*p < .05; **p < .01.

metacognitive beliefs reported higher levels of rumination and depression. Path analyses also showed that focusing and positive metacognitive beliefs have a specific contribution to rumination, which mediates their link with depression. Although focusing and positive metacognitive beliefs were significantly (and negatively) associated, they were independently linked to rumination. This result replicates those found in Study 1 and are in line with the impaired disengagement hypothesis, adding evidence to the idea that there are two different pathways through which people are impaired in effective disengagement which in turn may lead to rumination and depression.

6. General discussion

The impaired disengagement hypothesis proposes that individuals with difficulties in effective disengagement from negative thoughts and emotions are likely to experience persistent rumination which may lead to depressive symptoms. The theory suggests two different ways people may be impaired in effective engagement: impaired attentional control and impaired conflict signaling. In this work, we aimed to test these two ways by examining the specific role of attention control and positive metacognitive beliefs in rumination and depression in two different studies. We expected attentional control (assessed both through a performance task and via self-report) and positive beliefs would have a specific contribution to rumination, whereas rumination would mediate the associations between these variables and depression.

Together, the results of Study 1 and 2 confirmed our expectations. In line with the two different pathways proposed by the model, we found that attentional control and positive metacognitive beliefs had a specific contribution to rumination, and that rumination mediated the link between these beliefs and depressive symptoms. Moreover, these results were similar when assessing attentional control with different methods (performance task and self-report), in two different samples, and using different measures of rumination and symptoms of depression.

Both studies point out the relevance of inhibition as a facet of attentional control. Whether assessed via an incongruent Stroop task or via self-report as a perceived ability to ignore distracting information, inhibition is related to rumination and depression in our samples. This is a result consistent with the tenets of the impaired disengagement hypothesis, and with other similar approaches (see Joorman, 2010), which posits that the inability to prevent negative material from entering into the working memory and to expel it when it becomes irrelevant, lead to increased and maintained rumination. Several studies have found that attentional inhibition is related to both rumination and depression (Snyder, 2013; Yang et al., 2016), and there is evidence that self-reported focusing, but not shifting, predicts rumination (Cox et al., 2018; Mills et al., 2016). However, there are also contradictory results (Altamirano et al., 2010; DeJong et al., 2019; Zetsche & Joormann, 2011), so further research is needed to examine the role of different facets of attentional control in rumination and depression.

Our results have shown that attentional control is related to rumination and depressive symptoms when assessed both in a performance task as well as self-report. Previous studies have examined the associations between performance and self-reported attentional control, showing mixed findings, with the correlation between them ranging from non-significant to significant but low magnitude (DeJong et al., 2019; Reinholdt-Dunne, Mogg, & Bradley, 2013; Williams et al., 2017). These findings suggest that the two assessment methods may provide different information about attentional control. The performance task assesses actual implementation of attentional control, whereas the self-report assesses the perceived ability (or self-efficacy) to implement attentional control. These may be different constructs, and we found that both are related to rumination and depression and that both have a specific contribution to rumination that is independent of the effect of positive metacognitive beliefs. Noteworthy however, the magnitude of the correlations were higher when assessing self-reported attentional control compared to performance, a result that is consistent with previous research, which may in part be explained by common method variance (Williams et al., 2017).

We explored the potential interaction effect between positive metacognitive beliefs and attentional control, given recent research showing that children with lower levels of self-reported attentional control reported higher levels of symptoms when they also had higher levels of metacognitive beliefs about worry (Reinholdt-Dunne et al., 2019). However, we found that these interactions were not significant, a finding in line Koster and colleagues' (2011) original hypothesis that rumination is the result of either impaired conflict signaling or attentional control. There are some differences between the study of Reinholdt-Dunne et al. (2019) and ours that could help to explain our different results. These include different samples (they studied children), the type of metacognitive beliefs measured (they used a global measure of metacognitive beliefs about worry) and the outcomes (they assessed a global measure of anxiety and depression). Future research should continue to examine whether metacognitive beliefs and attentional control interact or are separate processes as indicated in the current study.

Our results indicate that the impaired disengagement hypothesis may be useful for understanding the role of rumination in depression. The difficulty disengaging attention may be due to a lack of ability of

attentional control or due to an impaired conflict signaling. In the former, some capacity to override and ignore negative thoughts and emotions are needed in order to process new information, so that people with impaired attentional control (i.e., inhibition) may fail to prevent the proliferation of negative information in working memory. In the latter, people may not reallocate their attention because they lack ability but rather because they have an impaired conflict signaling, a signal of cognitive conflict between the actual state (i.e., having negative thoughts and emotions) and the individuals' goals (i.e., not wanting to experience negative thoughts and emotions). People with positive metacognitive beliefs hold the idea that rumination is a useful and valuable emotion regulation strategy, eliciting less cognitive conflict and, thus, preventing the disengagement of attention. Moreover, the belief that rumination is an effective strategy that helps to understand emotions or find solutions can help sustain rumination in the long term, despite the negative consequences of this strategy (e.g., enhance depressive symptoms).

Our findings have clinical implications. Effective psychological interventions exist for the treatment of depression (e.g., cognitive-behavioral therapy or interpersonal psychotherapy). However, relapse and recurrence rates in these treatments are quite high. Our studies suggest that impaired attentional control and positive metacognitive beliefs are linked to rumination, which is a known risk factor for depression. This suggests that these variables may be relevant treatment targets.

Cognitive control training and metacognitive therapy are two types of treatments designed to address these mechanisms. Metacognitive therapy (Wells, 2009) targets metacognitive beliefs (e.g., questioning the belief that rumination is useful) through therapeutic techniques such as attention training, detached mindfulness, metacognitive restructuring and behavioral experiments (designed to modify metacognitive beliefs); and results from clinical trials have rendered promising results for depression (for a meta-analytic review see Normann et al., 2014). Cognitive control training aims at directly targeting deficits in cognitive control, and evidence (e.g., Koster et al., 2017; Motter et al., 2016) suggests that it is a promising intervention tool to reduce rumination, even in the long term (Swainston & Derakshan, 2018). If our results are confirmed in future research, especially using longitudinal designs, it could inform assessment of depression and have implications for the personalization of treatment. Different patients could benefit from different interventions. Cognitive control training could be useful for patients with deficits in attentional control whereas metacognitive therapy could be useful for patients with dysfunctional metacognitive beliefs (and some patients could benefit of both types of interventions).

Among the strengths of the current work are the use of two different samples, a multi-method approach to assess attentional control, and different measures of rumination and depression in Studies 1 and 2. Our studies also have several limitations that must be considered. First, it is not possible to attribute causality because of the cross-sectional design we used in both studies. Prospective and experimental designs are therefore necessary. Second, our sample consisted mainly of women, so future studies must corroborate our findings in gender-equilibrated samples. Third, the use of non-clinical samples precludes the generalization of our results to clinical samples; future research is needed to corroborate our findings in clinical settings. Fourth, we assessed attentional control using a performance task (Study1) and a self-report (Study 2), however, we used each type of measure in different samples. Future research should examine the effect of these measures in the same sample in order to explore their unique contribution to rumination and depression. Fifth, we used a variant of the Stroop task in which all items were incongruent color-word stimulus; future studies should test if our results can be replicated using Stroop tasks that include both congruent and incongruent items.

Our results also suggest new lines of research. First, inhibition appears to be the most relevant facet of attentional control in relation to rumination; however, further research is needed to examine separate attentional control facets (e.g., updating, inhibition and shifting) and their specific contribution to rumination and depression symptom (above and beyond positive metacognitive beliefs and other conflict signaling indices). Also, more research is needed to investigate the specific associations between attentional control facets and metacognitive beliefs. We found that focusing, but not shifting, was significantly (and negatively) associated with positive metacognitive beliefs (Study 2). It is possible that holding the belief that rumination is a useful strategy to regulate own negative emotions leads people to repeatedly direct their attention to these negative emotions, creating difficulties focusing their attention elsewhere. Moreover, a different pattern of direct and indirect effects of positive metacognitive beliefs in depression was found across studies (indirect and direct effect in the Study 1; only indirect effect in Study 2). It is possible that this result might be due to the fact that in Study 2, we measured rumination with an instrument that assesses rumination regardless of affective state, therefore potentially considering other affective states besides a depressed state.

Second, while evidence shows that impaired performance attentional control is associated with rumination regardless of the type of content stimuli (affective vs. neutral), longitudinal research testing path models that differentiates attentional control functions for general (neutral) and specific affective material is needed.

Finally, in line with the metacognitive model, we operationalized conflict signaling as positive metacognitive beliefs; however, we have not directly examined whether positive metacognitive beliefs contribute to rumination and depression directly or indirectly through their influence on different conflict signaling functions. Future studies should expand our findings by including variables such as affective reactivity and feedback awareness (in addition to metacognitive beliefs), which would allow for direct tests of individual differences in conflict signaling and their relationship to metacognitive beliefs, rumination, and depressive symptoms.

The present findings provide support for the impaired disengagement hypothesis, and suggest that attentional control and positive metacognitive beliefs should be considered in the assessment and the personalization of psychological interventions for depression.

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CRediT authorship contribution statement

José M. Salguero: Conceptualization, Methodology, Formal analysis, Writing – original draft, Supervision. **Juan Ramos-Cejudo:** Conceptualization, Methodology, Software, Writing – original draft, Supervision. **Esperanza García-Sancho:** Methodology, Investigation, Data curation. **Ilyana Arbulu:** Methodology, Investigation, Software. **José L. Zaccagnini:** Methodology, Investigation. **Johan Bjureberg:** Writing – review & editing. **James J. Gross:** Conceptualization, Writing – review & editing.

Declaration of competing interest

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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