The Role of Negative Affect, Rumination, Cognitive Fusion and Mindfulness on Depressive Symptoms in Depressed Outpatients and Normative Individuals

Joana Costa*, José Pinto Gouveia
Universidade de Coimbra, Portugal
João Marôco
Instituto Universitário de Ciências Psicológicas, Sociais e da Vida, Portugal

ABSTRACT

This study examined the mediating effect of rumination, cognitive fusion and mindfulness, in the relationship between negative affect (NA) and depressive symptoms, and the differences between depressed outpatients and normative individuals. A cross-sectional design, employing validated questionnaires was used to measure NA, depressive symptoms, rumination, cognitive fusion and mindfulness in 140 participants (70 with Major Depressive Disorder, 57 female; 70 normative individuals, 44 female). Our tested model showed that cognitive fusion was the only significant mediator of the relationship between NA and depressive symptoms. Furthermore, our results showed that both rumination and mindfulness have a mediation effect in the relationship between NA and cognitive fusion. A partial metric invariance was indicated, allowing the identification of specific parameters that may be acting differently in the two samples. Our study showed that individuals high in NA, who repeatedly think about negative aspects of the self/situations, may become easily attached to literal content of thoughts and less sensitive to the contingencies of direct experience, which may increases their depressive symptoms. However, adopting a non-evaluative perspective of unwanted private experiences, seems to be central to achieve a psychological distance from their negative thoughts/feelings, and possibly a consequential decrease of depressive symptoms. As rumination, cognitive fusion, and mindfulness operate differently across depressed outpatients and normative individuals, a deeply understanding of their unique relations allow us to plane more effective interventions.
Key words: negative affect, rumination, cognitive fusion, mindfulness, depression symptoms.

Novelty and Significance

What is already known about the topic?

- An increased and dysregulated NA is positively associated with high levels of depressive symptoms.
- Rumination, cognitive fusion, and mindfulness are involved mechanisms through which this relationship takes place.

What this paper adds?

- Rumination, cognitive fusion, and mindfulness operate differently across never-depressed individuals and depressed outpatients.
- Mindfulness components related to nonjudge and nonreact have strong effects in depressed outpatients.
- The importance of understanding their unique relations to outline effective interventions and the adjustment of treatments to the specific nature of each individual/disease.

Major depressive disorder (MDD) is an affective dysfunction, characterized by low mood and/or a decreased experience of pleasurable activities. It is one of the most prevalent psychiatric disorders, with a lifetime prevalence between 11.1% and 14.6%

according to the World Health Surveys, which use combined samples of 18 countries (Bromet, Andrade, Hwang, Sampson, Alonso, de Girolamo, *et alii*, 2011). In Portugal, the epidemiological studies reported a prevalence of depression of 7.9% in adult population (Sousa, 2015).

It is well established in previous literature the link between temperamental traits (e.g., negative affect, NA) and mental health (e.g., depression) (Clark & Watson, 1991). In brief, NA is a "general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive moods, such as anger, disgust, and fear" (Watson, Clark, & Carey, 1988, p.1063). Several theories have proposed that NA plays a large role in the development and maintenance of mood and anxiety disorders, in general, and depression, in particular (e.g., tripartite model, Tellegen, Watson, & Clark, 1999); transdiagnostic model of mood and anxiety disorders (Hoffman, Sawyer, Fang, & Asnaani, 2012). For instance, Hoffman *et alii* (2012) postulates that depression is characterized by, and predicted by the combination of high levels of NA and low levels of positive affect. This model is supported by recent studies suggesting that an increased and dysregulated NA is positively associated with high levels of stress (Dua, 1993), depressive symptoms (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Young & Dietrich, 2015), and may predict the onset of depression as well (Bos, Macedo, Marques, Pereira, Maia, Soares, Valente, Gomes, & Azevedo, 2013; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

Even though the combination of high levels of NA and low levels of positive affect is a well-known vulnerability for depression (Watson, Clark, & Tellengen, 1988), research has also shown that not all the individuals with this combination develop depressive symptoms (Catanzaro, Backenstrass, Miller, Mearns, Pfeiffer, & Brendalen, 2014). Actually, literature has indicated several mechanisms through which the relationship between NA and depressive symptoms takes place. Rumination, a negative repetitive thought process, is believed to be a likely candidate to mediate this relationship. Rumination is broadly defined as thinking repetitively and passively about negative emotions (Nolen-Hoekesema, 2000). It is now well-known that individuals who have experienced depression differ from normative individuals in the negative patterns of thinking. Indeed, for previously depressed individuals, sad moods reactivate a ruminative style of thinking in addition to the increased in negative thought content (Coffman, Dimidjian, & Baer, 2006; Segal, Williams, & Teasdale, 2002). Therefore, NA might prompt individuals to ruminate because they think that it might minimize the proneness to experience an array of negative emotional states (Iqal & Dar, 2016). Moreover, individuals believed that rumination could improves the understanding of their emotions, facilitates insight, and increases problem-solving ability. However, there is now strong empirical support for the association between rumination and depression (Iqal & Dar, 2016; Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1989; Watkins & Baracaia, 2001).

Like rumination, cognitive fusion is also believed to be a likely mediator in the relationship between NA and depressive symptoms. Cognitive fusion is refered to an excessive attachment to literal content of thoughts, memories, rather than the world of direct experience itself (Gillanders, Bolderston, Bond, *et alii*, 2014; Valdivia Salas, Sheppard, & Forsyth, 2010). As individuals fail to distinguish the product from the process of thinking, their behavior becomes controlled and overly regulated by cognition, and so less sensitive to the contingencies of direct experience (Romero Moreno, Márquez González, Losada, Fernández Fernández, & Nogales González, 2015). As individuals

avoid contact with undesirable inner experiences, the tendency to act on a fusion-basis is reinforced (e.g., this strategy promote a short time relief), and so their vulnerability to depression increases (Valvano, Floyd, Penwell-Waines, Stepleman, Lewis, & House, 2016).

More recently, the ability of being mindful, has been put forward as a robust predictor of mental health, with high levels of mindfulness consistently predicting less depressive and anxious symptomatology (Chadwick, Hember, Symes, Peters, Kuipers, & Dagnan, 2008; Greeson, 2009; Hofmann, Sawyer, Witt, & Oh, 2010; Nyklíček & Kuijpers, 2008). According to Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Taesdale, 2002), intentionally focused attention on thoughts, emotions, and sensations in this way uses much of the individual's capacity for attentional processing, so little room remains for rumination (Coffman *et alii*, 2006).

Mindfulness is typically defined as the awareness that emerges through paying attention on purpose, in the present moment and nonjudgmentally to the unfolding of experience moment by moment (Kabat-Zinn, 2003). Moreover, it comprises several dimensions such as observing experiences, describing them by means of words, acting with awareness, in a nonjudging and nonreacting way (Baer, Smith, Lykins, *et alii,* 2008). Of these, one of the most studied dimension is acting with awareness, which has been negatively associated to depressive symptoms. For instance, Dixon and Overall (2016) found that individuals that were high in acting with awareness also reported significantly lower depressed mood on days assessed has high stressful, in comparison to individuals low in acting with awareness.

The benefits of promoting dispositional mindfulness in well-being and symptom reduction are remarkably documented (Gu, Strauss, Bond, & Cavanagh, 2015, for a review). However, studies addressing the underlying mechanisms of mindfulness and depression are still scarce (Desoriers, Klemanski, & Nolen-Hoeksema, 2013; Teasdale, Williams, Soulsby, Segal, Ridgeway, & Lau, 2000). Also, few studies have looked at the individual influence of mindfulness components in clinical samples (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer *et alii*, 2008; Coffey, Hartman, & Fredrickson, 2010; Desosiers, Donald, Anderson, Itzoe, & Britton, 2010), and several inconsistencies are indicated (Barnhofer, Duggan, & Griffith, 2011; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011; Cash & Whittingham, 2010; Christopher, Neuser, Michael, & Baitmangalkar, 2012).

Given the inconsistencies of these relationships, it is important to better understand under what conditions, and through which mechanisms, mindfulness dimensions are beneficial to mental health. As such, this study examined the associations between NA and depressive symptoms with rumination, cognitive fusion, and mindfulness components. It further investigated the mediation effect of rumination, cognitive fusion and mindfulness components in the relationship between NA and depressive symptoms, and it differs in a MDD sample (i.e., depressed outpatients) and a normative sample (i.e., without any previous history of depression).

METHOD

Participants

Out of 157 patients invited, 142 initially consented to participate (response rate= 90.4%). Two patients were excluded due to the presence of a psychotic disorder. Of

a total of 140 participants, 70 individuals had a diagnosis of MDD (57 female, M_{age}= 55.02, SD= 14.10, range of age= 40.92- 69.12; 13 male, M_{age}= 66.85, SD= 11.94, range of age= 54.91- 78.79), and 70 normative individuals (e.g., individuals with no previous history of clinical depression) (44 female, M_{age}= 36.02, SD= 11.56, range of age= 24.46- 47.58; 26 male, M_{age}= 42.31, SD= 16.09, range of age= 26.22- 58.40).

Design

The study with a cross-sectional design was conducted with the formal approval from the clinical direction of the private unit. As such, attendees at the specialized private unit were recruited; if they expressed interest, they were given questionnaire packages that contained information sheets, consent forms and a series of validated self-report questionnaires designed to measure NA, rumination, cognitive fusion, mindfulness and depression.

Regarding depressed group, patients were eligible to participate if they were aged 18 years or over and had a primary diagnosis of MDD, according to the DSM-5 criteria. Patients were excluded based on having a psychotic disorder, or intellectual impairment (e.g., learning disability, Alzheimer´s dementia). The diagnosis was based on the opinion of the treating clinician (not involved as an author of the study). Regarding normative group, participants were recruited from general population. Individuals were eligible to participate if they were aged 18 or over and had not previous history of clinical depression (this information was provided by the participants).

The evaluation took place individually in a physician's office by a researcher involved in the study (JC). Each evaluation lasted between 30 to 45 minutes. According to ethical requirements, it was emphasized that participant's cooperation was voluntary and the answers were confidential.

Measures

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Galinha & Pais Ribeiro, 2005). A self-report measure that comprised two primary dimensions of affective structure, positive affect and NA, in a 10-item rated on a five-point (1= Nothing or very weakly; 5= Extremely) scale. In the present study, only negative affect items was used. The internal consistency, Cronbach's alphas were .87 and .66 for MDD group and normative group, respectively.

Ruminative Responses Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Pinto Gouveia & Dinis, 2006). A 10-item self-report questionnaire that assesses the way individuals think when they are feeling sad or depressed, rated on a four-point likert-scale from 1 (Almost never) a 4 (Often). In the present study, Cronbach's alphas were .84 and .87 for MDD group and normative group, respectively.

Cognitive Fusion Questionnaire (CFQ; Gillanders *et alii*, 2014; Costa, Marôco, & Pinto Gouveia, 2016). A 7-item self-reported measure rated on a seven-point Likert-scale (from 1= Never true to 7= Always true). In the present study, Cronbach's alphas were .91 for both MDD group and normative group.

Five Facet Mindfulness Questionnaire (FFMQ: Baer *et alii*, 2006; Gregório & Pinto Gouveia, 2011). A 39-item self-report measure rated on a five-point (1= Never/Very rarely true; 5= Always/Almost always true) scale. In this study only act with awareness, nonjudge and nonreact facets were used. In the present study, Cronbach's alphas were .95 and .94 for act with awareness facet, .94 and .90 for nonjudge facet, and .96 and .91 for nonreact facet for MDD group and normative group, respectively.

Depression, Anxiety and Stress Scales (DASS-42; Lovibond & Lovibond, 1995; Pais Ribeiro, Honrado, & Leal, 2004). A 42-item self-report that comprised three subscales aimed at assessing levels of depression, anxiety, and stress. Each item is rated on a 4-point rating scale ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). In this study, only depression subscale was used. The internal consistency, Cronbach's alphas were .96 and .93 for MDD group and normative group, respectively.

Demographic variables (e.g., gender, age, marital status, profession, years of education and clinical history) were assessed with a general checklist designed for this study.

Data Analysis

Product-moment Pearson correlation analyses were performed using SPSS (V. 22; SPSS, An IBM Company, Chicago, IL). The mediation analysis was performed using AMOS (V. 22; SPSS, An IBM Company, Chicago, IL). The presence of multivariate outliers was assessed with the squared Mahanalobis Distance (MD^2). Negative affect was assumed to be independent variables as measured by negative affect subscale of PANAS, depression subscale of DASS-42 is assumed to be the dependent variable and, rumination, cognitive fusion and mindfulness components related to act with awareness, nonreact and, nonjudge were assumed to be mediators as measured by RRQ, CFQ-7 and FFMQ, respectively. The indirect effects were analyzed with Bootstrap resampling. The model fit was evaluated using several descriptive fit indices: χ^2, comparative fit index (CFI), root mean square error of approximation (RMSEA) and its *p*-value for H0: RMSEA≤ .05, and Tucker-Lewis Index (TLI). The following cut-off criteria were considered: (1) CFI and TLI values equal to 0.90 or greater; (2) RMSEA values of 0.06 or below) (Hu & Bentler, 1999).

A Multigroup-Group Analysis was performed to show the equivalence of the proposed mediation model in depressed outpatients group and normative group. This includes two categories of analysis: measurement invariance and structural invariance. According to Jöreskog (1971, 1993), measurement invariance is based on nested models that follow a hierarchy of complexity with increasing constrains from one model to the next (e.g., measurement tests become increasingly restrictive). As such, a more complex model is only evaluated if the previous model has been shown to be invariant across groups (Brown, 2010; Byrne, 2010). It includes four models/categories: (1) Configural Invariance: This is the baseline model, which serves as the comparison standard for subsequent tests. "Equal form" means that the number of factors and pattern of indicator-factor loadings are identical across groups. Configural invariance is satisfied if the basic model structure is invariant across groups. It indicates that participants from different groups conceptualize the constructs in the same way. (2) Metric Invariance or weak factorial invariance: means equality of factor loadings. This model tests if different groups respond to the items in the same way; that is, the strengths of the relations between specific scale items and their underlying construct are the same across groups. If metric invariance is satisfied, obtained ratings can be compared across groups and observed item differences will indicate group differences in the underlying latent construct. (3) Scalar Invariance or strong factorial invariance: means the equality of the indicator intercepts. It indicates that observed scores are related to latent scores; that is, individuals who have the same score on the latent construct would obtained the same score on the

observed variables regardless of their group membership. (4) Error Variance Invariance or strict factorial invariance: means equality of indicator residuals. This means that the same level of measurement error is present for each item across groups.

Structural invariance, on the other hand, does not follow a hierarchy of nested models with increasing constrains from one model to the next. In the specific case of a unidimensional model, structural invariance assess whether the construct of the variability level is equivalent to the subjects of different groups.

Both absolute and incremental fit indices were used to compare the unconstrained model with one having measurement invariance constraints. In addition to significant χ^2 difference test, CFI decreases greater than 0.01 in magnitude, was used as criterion to reject the null hypothesis (e.g., the more restrictive model should be rejected) (Dimitrov, 2010).

Results

Results showed (Tables 1 and 2) a high and positive correlation between NA and depressive symptoms (r= .721; $p \leq$ .001) with high levels of NA associated with high levels of depressive symptoms. High and positive correlation were also indicated between rumination and depression symptoms (r= .611; $p \leq$ .001), and between cognitive fusion and depressive symptoms (r= .656; $p \leq$ .001).

Lastly, results showed low to moderate and negative correlations between the mindfulness components and depressive symptoms, ranged from -.387 ($p \leq$ .001; act with awareness) to -.485 ($p \leq$ .001; nonjudge), with low mindfulness components associated with high levels of depressive symptoms.

Results showed a high and positive correlation between NA and depressive symptoms (r= .574; $p \leq$ .001) with high levels of NA associated with high levels of depressive symptoms. Low and positive correlation were also indicated between rumination and depression symptoms (r= .381; $p \leq$ .001), and a high and negative correlation between cognitive fusion and depressive symptoms (r= .648; $p \leq$ .001).

Lastly, results showed moderate to high and negative correlations between the mindfulness components and depressive symptoms, ranged from -.430 ($p \leq$ .001; nonjudge) to -.520 ($p \leq$ .001; nonreact), with low mindfulness components associated with high levels of depressive symptoms.

The mediation model of rumination, cognitive fusion and mindfulness components was adjusted to 140 individuals, 70 depressed outpatients and 70 normative individuals (39 males; 101 females). Based on p-values five path coefficients were excluded from the analysis, and the model re-specified. The model showed a good fit to the variance-covariance structure ($\chi^2(5)$= 5.177; p= .395; χ^2/df= 1.035; CFI= 1.000; TLI= .999; PCFI= .238; RMSEA= .016, $p[rmsea \leq .05]$= .581). All predictors as theorized by the model explained 61% of depressive symptoms (Figure 1).

Negative affect had a direct effect on depressive symptoms (β= .324) and a mediate effect through cognitive fusion ($\beta_{\text{Depressive Symptoms.Cognitive Fusion}}$ x $\beta_{\text{Cognitive Fusion.Negative Affect}}$= .513x.284= .146; p= .001; 95% CI= .386; .785). This showed that depressive symptoms increased by about .146 standard deviations for every increased of a full standard deviation in NA via its prior effect on cognitive fusion. Thus, the effect size was .925, which according to Preacher and Kelley (2011) is a strong effect.

Moreover, NA had a mediate effect through rumination ($\beta_{\text{Cognitive Fusion. Rumination}}$ x $\beta_{\text{Rumination.Negative Affect}}$= .187x.513= .096; p= .001; 95% CI= .483; .789) on cognitive

fusion. This showed that cognitive fusion increased by about .096 standard deviations for every increased of a full standard deviation in NA via its prior effect on rumination. This indirect effect had an effect size of .549, which according to Preacher and Kelley (2011) is a moderate effect.

Additionally, results also showed that NA has two mediated effects, one through mindfulness component related to nonjudging ($\beta_{\text{Cognitive Fusion.NonJudging}}$ x $\beta_{\text{NonJuding.Negative Affect}}$= -.291 X -.512= .149; p= .001; 95% CI= .483; .789) on cognitive fusion, and the other through mindfulness component related to nonreacting ($\beta_{\text{Cognitive Fusion.NonReacting}}$ x $\beta_{\text{NonReacting.Negative Affect}}$= -.340x-.583= .198; p= .001; 95% CI= .483; .789) on cognitive fusion. These indirect effects have strong size effects of .889 and .897, respectively, according to Preacher and Kelley (2011). This showed that cognitive fusion increased by about .149 standard deviations for every increased of a full standard deviation in NA via its prior effect on mindfulness component related to nonjudge. Results also indicated that cognitive fusion increased by about .198 standard deviations for every increased of a full standard deviation in NA via its prior effect on mindfulness component related to nonreact.

The equivalence of the proposed mediation model across both groups was tested with Multigroup Analysis. Results for configural invariance indicated that the fit of the model was satisfactory, $\chi^2(10)$= 12.990; p= .224; χ^2/df= 1.299; CFI= .994; PCFI= .237; TLI= .976; RMSEA= .047, $p(r$msea$\leq$ .05)= .476. Therefore, the basic model structure is equal across all groups, indicating that participants from different groups conceptualize the constructs in the same way. Thereafter, nested model comparisons were tested follow a complexity with increasing constrains from one model to the next (e.g., imposing a more restrictive level of invariance across the samples). Based on our aim, factor variances were then constrained to be equal across groups (factor variance invariance). As expected, these constrains did significantly worsen the model fit as compared to the unconstrained model ($\chi^2(10)$= 30.974; p= .001) and did not allow to conclusions related to metric invariance. As we were specifically interested in statistically proved the specific parameters that act differentially in both depressed and never-depressed samples, we have chosen to restrict all parameters with the exception of the parameters related to rumination $\rightarrow$ cognitive fusion; cognitive fusion $\rightarrow$ depressive symptoms, mindfulness component related to nonjudge $\rightarrow$ cognitive fusion and, mindfulness component related to nonreact $\rightarrow$ cognitive fusion. The comparison between this new constrained model and the unconstrained model showed a non-significant χ^2 difference ($\chi^2(6)$= 11.305; p= .079). Thus, it allowed us to identify that these specific parameters acted differently in both samples, with the stronger parameters being identified in major depressive disorder group. As such, a partial metric invariance was assumed.

Table 1. Demographic characteristics of both groups.

	MDD Group			Normative Group		
	Female (n= 57)	Male (n= 13)	χ^2	Female (n=44)	Male (n=26)	χ^2
Marital State			.252			.323
Single	6	1		14	10	
Married/Union	40	10		28	15	
Divorced	6	1		2	1	
Widower	5	1		0	0	
	M (DP)	M (DP)	t	M (DP)	M (DP)	t
Age	55.02 (14.1)	66.85 (11.94)	2.796*	36.02 (11.56)	42.31 (16.09)	1.884
Education	8.63 (13.61)	4.23 (3.3)	-1.152	13.12 (3.65)	11.67 (4.74)	-1.398

Notes: MDD Group= Participants with Major Depressive Disorder; Normative Group= Participants without any previous history of clinical depression; *= p< .05.

Table 2. Means, standard deviations and correlations of Normative and MDD groups on clinical assessments.

		M	SD	NA	R	CF	AAF	NJF	NRF
	NA	15.37	5.52	-	-	-	-	-	-
	R	20.33	5.97	.381**	-	-	-	-	-
Normative	CF	21.72	7.06	648***	.639***	-	-	-	-
Group	AAF	31.77	6.48	-.459***	-.231	-.354**	-	-	-
(*n*= 70)	NJF	28.33	5.56	-.393**	-.579***	-.709***	.331**	-	-
	NRF	22.14	5.84	-.594***	-.466***	-.687***	.470***	.433***	-
	D	4.24	5.56	.575***	.397**	.664***	-.456***	-.430***	-.520***
	NA	19.57	5.94	-	-	-	-	-	-
	R	24.4	6.57	.514***	-	-	-	-	-
MDD	CF	30.97	6.77	.657***	.732***	-	-	-	-
Group	AAF	28.4	7.41	-.389**	-.296*	-.483***	-	-	-
(*n*= 70)	NJF	23.36	6.11	-.471***	-.649***	-.621***	.427***	-	-
	NRF	14.96	6.94	-.448***	-.513***	-.803***	.491***	.414***	-
	D	12.17	10.7	.721***	.611***	.656***	-.387**	-.485***	-.447***

Notes: AAF= Act with Awareness Facet; CF= Cognitive Fusion; D= Depression; MDD Group= Participants with Major Depressive Disorder; NA= Negative Affect; NJF= NonJudge Facet; Normative Group= Participants without any previous history of clinical depression; NRF= NonReact Facet; R= Rumiation; *= *p* <.05; **= *p* <.01; ***= *p* <.001.
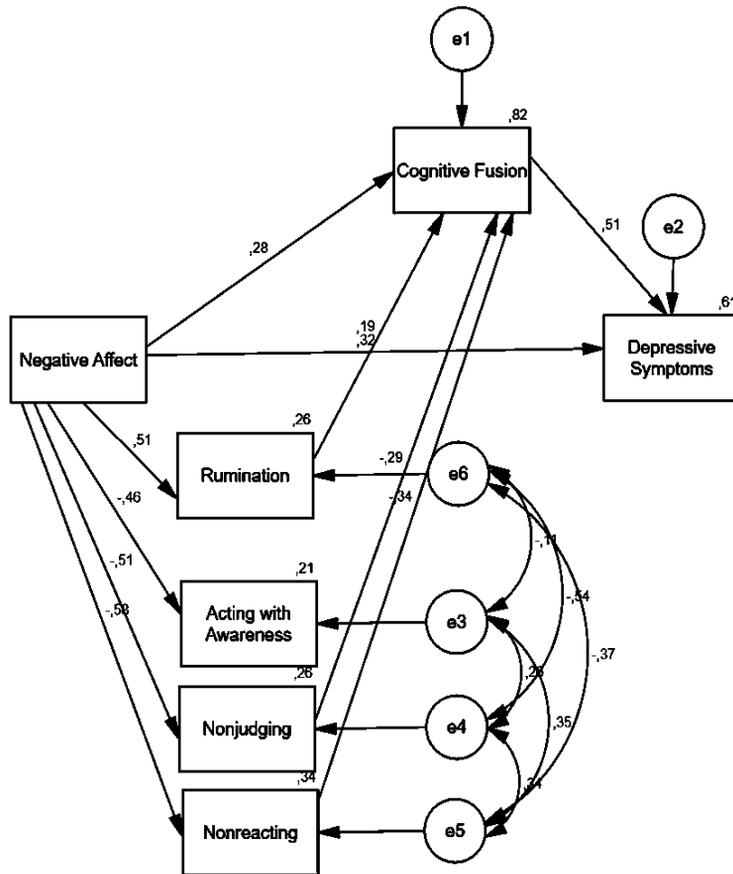

Figure 1. Final Mediation Model tested of Negative Affect, Rumination, Cognitive Fusion, Mindfulness components and Depressive Symptoms.

Discussion

This study examined the associations between NA and depressive symptoms with rumination, cognitive fusion, and mindfulness components. Furthermore, this study investigated the mediation effect of rumination, cognitive fusion, and mindfulness components in the relationship between NA and depressive symptoms, and its differences in a sample of MDD individuals and normative individuals. Our results confirmed a high and positive associations between NA, depression, and rumination, as previously demonstrated (e.g., Iqal & Dar, 2016; Kuehner & Weber, 1999; Lyubomirsky & Tkach, 2004; Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, 1991; Watson, Clark, & Carey, 1988; Watson, Clark, & Tellegen, 1988; Young & Dictrich, 2015; Watikins & Baracia, 2001). Further, our results also showed a high and positive association between cognitive fusion and depression (Nolen-Hoeksema, 1991; Valvano *et alii*, 2016). As in previous research, our results also showed that lower levels of mindfulness were associated with more depressive symptoms (Baer *et alii*, 2006; Baer et alii, 2008; Lykins & Baer, 2009; Teasdale *et alii*, 2000; Hoffman *et alii*, 2010). Most of research available examined the levels of mindfulness and mental health outcomes following interventions (Baer, 2003; Hofman, Sawyer, Witt, & Oh, 2010), and little known about the effect of specific components of mindfulness in non-treatment seeking samples (Barnes & Lynn, 2010; Oliver, McLachlan, Jose, & Peters, 2012).

Second, we investigated the mediation effects of rumination, cognitive fusion and mindfulness components in the relationship between NA, and depressive symptoms. Based on inconsistencies found in past research, only mindfulness components related to acting with awareness, nonjudging, and nonreacting were involved in the mediation model (Calvete, Orue & Sampedro, 2017; Cash & Whittingham, 2010; Curtiss & Klemanski, 2014; Desoriers, Vine, Curtis, & Klemanski, 2014).

Our tested model showed that cognitive fusion was the only significant mediator of the relationship between NA and depressive symptoms, accounting for 61 percent of the total variance. Despite NA still has a direct effect on depressive symptoms, cognitive fusion seems to buffer this relationship. Even though this is the first time a study investigated all these constructs in a single model, the results are in line with previous research that have looked at these relationships separately (Clark & Watson, 1991; Gillanders *et alii*, 2014; Hoffman *et alii*, 2010; Lyubomirsky & Tkach, 2004; Valvano *et alii*, 2016; Young & Dictrich, 2015).

Although previous research has indicated rumination as a mediator in the relationship between NA and depressive symptoms (Iqbal & Dar, 2016; Nolen-Hoeksema, 1991), this was not confirmed in our model. Despite that, rumination has a mediation effect in the relationship between NA and cognitive fusion. As in previous research, our results showed that when individuals experience NA, they engage in rumination, because they believe this might minimize the proneness to experience an array of emotional states (Lyubomirsky & Nolen-Hoeksema, 1995; Watkins & Baracaia, 2001). Further, rumination persists despite its negative consequences (e.g., poor psychological outcomes, such as depression) as individuals thought this could give them a better understanding of their emotion, and help them to solve their problems. However, as they repeatedly think about negative aspects of self and/or problematic situations, individuals become attached to the literal content of thoughts, and less sensitive to the contingencies of direct experience. Accordingly, they tend to follow rules that suggest that some experiences must be avoided, controlled or changed. Actually, individual's

fusion with verbal reasons seems to be responsible for the maintenance of rumination and the avoidance of functional behaviours (Kerr, 2011; Valvano *et alii*, 2016). This may indicates that cognitive fusion is not secondary to depression and does appear to be implicated in the ruminative process (Kerr, 2011).

As for rumination, our model showed that mindfulness dimensions did have a mediation effect in the relationship between NA and cognitive fusion. Indeed, our results indicated that mindfulness components related to nonreacting and nonjudging inner experiences had a strong buffering influence on cognitive fusion. This seems to indicate that, by assuming a non-evaluative perspective towards negative thoughts and feelings, and allow these inner experiences to come and go, without reacting or fixating them, individuals high in NA were more able to achieve a psychological distance from their thoughts and feelings (Luoma, Hayes, & Walser, 2007). As individuals interrupt their old habitual patterns of thinking or behaving, and adopt a mindfulness perspective instead of prolonged rumination, these sad moods do not escalate into more severe affective states, which are in line with MBCT (Coffman *et alii*, 2006; Segal *et alii*, 2002).

Finally, we have also investigated the invariance of this mediation model by comparing the MDD group and the normative group and never-depressed individuals. Our findings showed that the influence of rumination, cognitive fusion and mindfulness on depressive symptoms varied across both groups. Specifically, our results seem to show that the effect of both nonreact and nonjudge components of mindfulness on depressive symptoms is mediated by individual's levels of cognitive fusion. Therefore, being mindful seems to decrease the impact of cognitive fusion in depressive symptoms. According to current results, this seems to be particular prevalent in MDD group. Besides the means values for both nonreact and nonjudge components are high in normative group, they show their particular usefulness in the presence of high depressive symptoms.

The contribution of this study is twofold. Firstly, it confirms that mindfulness components do not operate homogenously across individuals with MDD and individuals without previous history of clinical depression (e.g., normative group). Secondly, it showed that beside the importance of de-fusion strategies, mindfulness-based skills may be more effective, particularly approaches focused on nondjuging and nonreacting. In line with previous research, it could be said that patients with MDD may benefit from techniques that foster nonreactivity and nonjudging (Desrosiers *et alii*, 2013), such as loving kindness meditation, compassion meditations, and nonreactivity through distress tolerance exercise (e.g., urgesurfing, breath awareness).

Although there is already some research on dispositional mindfulness, there are still many unanswered questions about its role in mental health as well. For instances, previous research has shown the central role of act with awareness in depressive symptoms. Although the current findings do not allow us to show its effect, future research should clarify the association between the mindfulness component related to act with awareness and depression. Specifically, it is important to better understand under what conditions, and through which mechanisms, this specific component is beneficial (Fernández, Wood, Stein, & Rossi, 2010; Vinci, Peltier, Shah, Kinsoul, Waldo, McVay, & Coopleland, 2014). As such, future research should study the association between act with awareness and depression, independently of other mindfulness components. Further to that, longitudinal designs should also be considered, as previous research has indicated surprising and somewhat counterintuitive associations between this component and psychological measures (Calvete, Orue, & Sampedro, 2017).

Despite the insights that the present study provides, some methodological limitations are worth noting. The cross-sectional design used in this study does not prove causation nor evaluates the temporal stability. Actually, all variables were assessed at the same point of time and therefore the temporal order of change is not clear, which is clearly a major concert and limitation of our study. Nevertheless, interpretations were made based on the underlying theory of MBCT. It is however important to notice that the present findings represent a preliminar study and so, future longitudinal research must confirm them, using more sophisticated causal mediation methods, such as sensitivity analysis, for assessing the effects of unobserved confounders and temporal stability, as suggested by Lee, Hübscher, Moseley, Kamper, Traeger, Mansell, and McAuley (2015). The possible degree of overlap between key variables and further to that, a lack of objective measures (as all variables were based on subjective self-report) should also be indicated. Also, the mindfulness formal practice was not assessed, and significant association can be found between formal practice and psychological functioning (Baer *et alii*, 2006; Baer *et alii*, 2008).

In conclusion, this study confirms that the components of mindfulness do not operate homogenously across MDD and normative groups, and identifies a buffer mechanism of specific components of mindfulness related to nonjudging and nonreacting on cognitive fusion that might have its influence on depressive symptoms as well. Hopefully, this study will contribute to a wider discussion about how to best serve our patients with different levels of depressive symptoms, making use of their existing strengths, or build others skills.

References

Aldao A, Nolen-Hoeksema S, & Schweizer S (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review. 30*, 217-37. Doi: 10.1016/j.cpr.2009.11.004

Baer R, Smith G, Hopkins J, Krietemeyer J, & Toney L (2006). Using Self- report assessment methods to explore components of mindfulness. *Assessment, 13*, 27-45. Doi: 10.1177/1073191105283504

Baer R, Smith G, Lykins E, Button D, Krietemeyer J, Sauer S, Walsh E, Duggan D, & Williams JMG, (2008). Construct validity of the five component mindfulness questionnaire in meditating and non meditating samples. *Assessment, 15*, 329-342. Doi: 10.1177/1073191107313003

Barnes S & Lynn S (2010). Mindfulness skills and depressive symptoms: A longitudinal study. *Imagination, Cognition and Personality, 20*, 77-91. Doi: 10.2190/IC.30.1.e

Barnhofer T, Duggan D, & Griffith J (2011). Dispositional mindfulness moderates the relation between neuroticism and depressive symptoms. *Personality and Individual Differences, 51*, 958-962. Doi: 10.1016/j.paid.2011.07.032

Bohlmeijer E, ten Klooster P, Fledderus M, Veehof M, & Baer R (2011). Psychometric properties of the five components of mindfulness questionnaire in depressed adults and development of a short form. *Assessment, 18*, 308-320. Doi: 10.1177/1073191111408231

Bryre B (2010). *Strutural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd Ed.). New York: Routedge, Taylor & Francis.

Bromet E, Andrade L, Hwang I, Sampson N, Alonso J, de Girolamo G, de Graaf R, Demyttenaere K, Hu C, Iwata N, Karam AN, JKaur J, Kostyuchenko S, Lépine JP, Levinson D, Matschinger H, Medina Mora ME, Browne MO, Posada Villa J, Viana MC, Williams DR, & Kessler RC (2011). Cross-national epidemiology of DSM-IV major depressive episode. *BMC Medicine, 9*, 90. Doi: 10.1186/1741-7015-9-90

Brown T (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.

Calvete E, Orue I, & Sampedro A (2017). Does the acting with awareness trait of mindfulness buffer the predictive association between stressors and psychological symptoms in adolescents? *Personality and Individual Differences, 105*, 158-163. Doi: 10.1016/j.paid.2016.09.055

Cash M & Whittingham K (2010). What components of mindfulness contribute to psychological well-being and

depressive, anxious, and stress-related symptomatology? *Mindfulness, 1*, 177-182. Doi: 10.1007/s12671-010-00234

Catanzaro S, Backenstrass M, Miller S, Mearns J, Pfeiffer N, & Brendalen S (2014). Prediction of symptoms of emotional distress by mood regulation expectancies and affective traits. *International Journal of Psychology, 49*, 471-479. Doi: 10.1002/ijop.12062

Chadwick P, Hember M, Symes J, Peters E, Kuipers E, & Dagnan D (2008). Responding mindfully to unpleasant thoughts and images. Reliability and validity of the Southampton Mindfulness Questionnaire (SMQ). *British Journal of Clinical Psychology, 47*, 451-455.

Clark L & Watson D (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*, 316-336.

Coffman S, Dimidjian S, & Baer R (2006). Mindfulness-Based Cognitive Therapy for prevention of depressive relapse. In R Baer (Eds.), *Mindfulness-Based Treatment Approaches*. *Clinician's Guide to Evidence Base and Applications* (pp. 31-50), Burlington: Elsevier Academic press.

Coffey K, Hartman M, & Fredrickson B (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulnesss, 1*, 235-253. Doi: 10.1007/s1267-010-0033-2

Costa J, Marôco J, & Pinto-Gouveia J (2016). *Validation of the psychometric properties of Cognitive Fusion Questionnaire*. *A study of the factorial validity and factorial invariance of the measure among Osteoarticular Disease, Diabetes Mellitus, Obesity, Depressive Disorder and General Population*. Universidade de Coimbra, Unpublished.

Christopher M, Neuser N, Michael P, & Baitmangalkar A (2012). Exploring the psychometric properties of the five facets of mindfulness questionnaire. *Mindfulness, 3*, 124-131. Doi: 10.1007/s12671-011-0086-x.

Curtiss J & Klemanski D (2014). Factor analysis of the five facets mindfulness questionnaire in a heterogeneous clinical sample. *Journal of Psychopathology and Behavioral Assessment, 36*, 683-694. Doi: 10.1007/s10862-014-9429-y

Desosiers A, Donald R, Anderson M, Itzoe M & Britton W (2010). *School based mindfulness training may offer clinical benefits*. World Congress of Behavioral and Cognitive Therapy (WCBCT), Boston.

Desrosiers A, Klemanski D, & Nolen-Hoeksema S (2013). Mapping mindfulness components onto dimensions of anxiety and depression. *Behavior Therapy, 44*, 373-384. Doi: 10.1016/j.beth.2013.02.001

Desoriers A, Vine V, Curtiss J, & Klemanski D (2014). Observing nonreactively: A conditional process model linking mindfulness facets, cognitive emotion regulation strategies, and depression and anxiety symptoms. *Journal of affective disorders, 165*, 31-37. Doi: 10.1016/j.jad.2014.04.024

Dimitrov D (2010). Testing for Factorial Invariance in the Context of Construct Validation. *Measurement and Evaluation in Counseling and Development, 43*, 121-149. Doi: 10.1177/0748175610373459

Dixon H & Overall N (2016). Dispositional mindfulness attenuates the link between daily stress and depressed mood. *Journal of Social and Clinical Psychology, 35*, 255-268. Doi: 10.1521/jscp.2016.35.3.255

Dua J (1993). The role of negative affect and positive affect in stress, depression, self-esteem, assertiveness, Type A behaviors, psychological health, and physical health. *Genetic, Social, and General Psychology Monographs*. *119*, 515-52

Fernández A, Wood M, Stein L, & Rossi J (2010). Measuring mindfulness and examining its relationship with alcohol use and negative consequences. *Psychology and Addictive Behavior, 24*, 608-616. Doi: 10.1037/a0021742

Galinha I & Pais-Ribeiro P (2005). Contribuição para o estudo da versão portuguesa da Positive and Negative Affect Schedule (PANAS): II- Estudo psicométrico [Contribution to the study of the Portuguese version of Positive and Negative Affect Schedule (PANAS): II- psychometric study]. *Análise Psicológica, 2*, 219-227.

Gillanders D, Bolderston H, Bond F, Dempster M, Flaxman P, Campbell L, Kerr S, Tansey L, Noel P, Ferenbach C, Masley S, Roach L, Lloyd J, May L, Clarke S, & Remington B (2014). The development and initial validation of The Cognitive Fusion Questionnaire. *Behavior Therapy, 45*, 83-101. Doi:10.1016/j.beth.2013.09.001

Gregório S & Pinto-Gouveia J (2011). Componentas de mindfulness: características psicométricas de um instrumento de avaliação [Components of Mindfulness: psychometric characteristics of a measure]. *Psychogica, 54*, 259-280.

Greeson J (2009). Mindfulness Research Update: 2008. *Complementary Health Practice Review, 1*, 10-18. Doi: 10.1177/1533210108329862

Gu J, Strauss C, Bond R, & Cavanagh K (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation

studies. *Clinical and Psychology Review, 37*, 1-12. Doi: 10.1016/j.cpr.2015.01.006.

Hoffman S, Sawyer A, Fang A, & Asnaani A (2012). Emotion dysregulation model of mood and anxiety disorders. *Depression and Anxiety, 29*, 409-416. Doi: 10.1002/da.21888

Hofmann S, Sawyer A, Witt A, & Oh D (2010). The effect of mindfulness-based therapy on anxiety and depression. A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169-183. Doi: 10.1037/a0018555

Hu L & Bentler P (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1-55. Doi: 10.1080/10705519909540118

Iqbal N & Dar K (2016). Negative affectivity, depression, and anxiety: Does rumination mediate the links? *Journal of Affective Disorders, 181*, 18-23. Doi: 10.1016/j.jad.2015.04.002

Jöreskog K (1971). Simultaneous factor analysis in several populations. *Psychometrika, 36*, 409-426.

Jöreskog K (1993). Testing structural equation models. In K Bollen & S Long (Eds.), *Testing structural equation models* (pp. 294-316). Newbury Park, CA: Sage.

Kabat-Zinn J (2003). *Full Catastrophe Living: Using the wisdom of your mind to face stress, pain, and illness*. New York: Bantam Books.

Kenny DA (2017). MedPower: An interactive tool for the estimation of power in tests of mediation (Computer software). Retrieved from https://davidakenny.shinyapps.io/PowerMed

Kerr E (2011). *Investigation of the relationship between depression, rumination, metacognitive beliefs and cognitive fusion*. Doctoral Thesis, Edinburgh University. Retrieved from http://hdl.handle.net/1842/5626

Kuehner C & Weber I (1999). Responses to depression in unipolar depressed patients: an investigation of Nolen-Hoeksema's response styles theory. *Psychological Medicine, 29*, 1323-33.

Lee, H., Hübscher, M., Moseley, G., Kamper, S., Traeger, A., Mansell, G. & McAuley, J. (2015). How does pain lead to disability? A systematic review and meta-analysis of mediation studies in people with back and neck pain. *Pain, 156*, 988-997. Doi: 10.1097/j.pain.0000000000000146

Lovibond P & Lovibond H (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with Beck Depression and Anxiety Inventories. *Behavioral Research and Therapy 3*, 335-343.

Luoma J, Hayes S, & Walser R (2007). *Learning ACT: An Acceptance & Commitment Therapy Skills-Training Manual for Therapists*. Oakland, CA: New Harbinger.

Lyubomirsky S & Nolen-Hoeksema S (1995). Effects of self-focused rumination on negative thinking and interpersonal problem solving. *Journal of Personality and Social Psychology, 69*, 176-90.

Lyubomirsky S & Tkach C (2004). The consequences of dysphoric rumination. In C Papageorgiou & A Well (Eds.), *Depressive Rumination: Nature, theory and treatment* (pp. 21-41). John Wiley & Sons: West Sussex.

Lykins E & Baer R (2009). Psychological functioning in a sample of long-term practitioners of mindfulness meditation. *Journal of Cognitive Psychotherapy, 23*, 226-241. Doi: 10.1891/0889-8391.23.3.226

Morrow J & Nolen-Hoeksema S (1990). Effects of responses to depression on the remediation of depressive affect. *Journal of Personality and Social Psychology, 58*, 519-527. Doi: 10.1037//0022-3514.58.3.519

Nolen-Hoeksema S (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*, 569-582. Doi: 10.1037//0021-843X.100.4.569

Nolen-Hoekesema S (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109*, 504-511. Doi: 10.1037//0021-843X.109.3.504

Nolen-Hoeksema S & Morrow J (1989). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology, 61*, 115-121.

Nolen-Hoeksema S, Wisco B, & Lyubomirsky S (2008). Rethinking Rumination. *Perspectives on Psychological Science, 3*, 5400-5424. Doi: 10.1111/j.1745-6924.2008.00088x.

Nyklíček I & Kuijpers K (2008). Effects of mindfulness-based stress reduction intervention on psychological well-being and quality of life: Is increased mindfulness indeed the mechanism? *Annals of Behavioral Medicine, 35*, 331-340. Doi: 10.1007/s12160-008-9030-2.

Oliver J, McLachlan K, Jose P, & Peters E (2012). Predicting changes in delusional ideation: the role of mindfulness and negative schemas. *Psychology and Psychotherapy, 85*, 243-59. Doi: 10.1111/j.2044-8341.2011.02025.x.

Pais-Ribeiro J, Honrado A, Leal I (2004). Contribuição para o estudo da adaptação portuguesa das escalas de depressão ansiedade stress de Lovibond e Lovibond [Contribution to the study of the Portuguese adaptation of the depression anxiety stress scales Lovibond and Lovibond]. *Psychologica, 36*, 235-246.

Pinto-Gouveia J & Dinis A (2006). Questionário de Respostas Ruminativas. Versão Portuguesa [Ruminative Responses Questionnaire. Portuguese version] Unpblished manuscript, Universidade de Coimbra.

Preacher K & Kelley K (2011). Effect Size Measures for Mediation Models: Quantitative Strategies for Communicating Indirect Effects. *Psychological Methods, 16*, 93-115. Doi: 10.1037/a0022658

Romero Moreno R, Márquez González M, Losada A, Fernández Fernández V, & Nogales González C (2015). Ruminación y Fusión cognitiva en el cuidado familiar de personas con dementia [Rumination and Cognitive fusion in family care of people with dementia]. *Revista Española de Geriatría y Gerontología, 50*, 216-222. Doi:10.1016/j.regg.2015.02.007

Segal Z, Williams J, & Teasdale J (2002). *Mindfulness-based Cognitive Therapy for Depression- A new approach to preventing relapse*. New York: Guilford Press.

Sousa J (2015). *Epidemiologia, etiopatogenia, diagnóstico e tratamento farmacológico da depressão em Portugal*. Dissertação de mestrado, Universidade Fernando Pessoa- Faculdade de Ciências da Saúde. Retrieved from http://bdigital.ufp.pt/bitstream/10284/5329/1/PPG_24560.pdf

Teasdale J, Williams J, Soulsby J, Segal Z, Ridgeway V, & Lau M (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615-623.

Tellegen A, Watson D, & Clark LA (1999). On the dimensional and hierarchical structure of affect. *Psychological Science, 10*, 297-303. Doi: 10.1111/1467-9280.00157

Treynor W, Gonzalez R, & Nolen-Hoeksema S (2003). Rumination reconsidered a psychometric analysis. *Cognitive Therapy and Research, 27*, 247-259. Doi:. 10.1023/A:1023910315561

Vinci C, Peltier M, Shah S, Kinsoul J, Waldo K, McVay M, & Coopleland A (2014). Effects of a brief mindfulness intervention on negative affect and urge to drink among college student drinkers. *Behavioral, Research and Therapy, 59*, 82-93. Doi: 10.1016/j.brat.2014.05.012.

Valdivia Salas S, Sheppard SC & Forsyth JP (2010). Acceptance and Commitment Therapy in an emotion regulation context. In D King & D Sloan (Eds.), *Emotion regulation* (pp. 313-338). New York: Guilford Press.

Valvano A, Floyd R, Penwell-Waines L, Stepleman L, Lewis K, & House A (2016). The relationship between cognitive fusion, stigma, and well-being in people with multiple sclerosis. *Journal of Contextual Behavioral Science, 5*, 266-270. Doi: 10.1016/j.jcbs.2016.07.003

Watkins E & Baracaia S (2001). Why people ruminate in dysphoric moods? *Personal and Individual Differences, 30*, 723-734. Doi: 10.1016/S0191-8869(00)00053-2

Watson D, Clark A, & Tellengen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology. 54*, 1063-1070.

Watson D, Clark A, & Carey G (1988). Positive and negative affectivity and their relations to anxiety and depressive disorders. *Journal of Abnormal Psychology, 97*, 346-353.

Watson D, Clark L, & Tellegen A (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070. Doi: 10.1037//0022-3514.54.6.1063

Young C & Dictrich M (2015). Stressful Life Events, Worry, and Rumination Predict Depressive and Anxiety Symptoms in Young Adolescents. *Journal of Child and Adolescent Psychiatric Nursing, 28*, 35-42. Doi: 10.1111/jcap.12102