The relationship between negative affect regulation, positive affect regulation and depression and the moderating effect of gender

Master's Thesis Clinical Psychology

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Abstract

Depression is currently the third leading contributor to the global disease burden, and it is expected that it will rise to the first place by 2030. Identifying underlying mechanisms in depression is specifically pressing and could lead to valuable implications for the development of effective psychological treatments. Most of the research on emotion regulation and depression has focused on negative affect (NA) regulation, but there is a growing interest in investigating positive affect (PA) regulation. The aim of the present study was to examine to what extent NA and PA regulation contribute to depression and to investigate whether gender was a moderator of the relationship between NA and PA regulation and depression. The study was conducted in a specialized mental health care facility in the Netherlands, with $N = 374$ participants. The Inventory of Depressive Symptomatology (IDS-SR) determined depression. The Responses to Positive Affect Questionnaire (RPA-NL), consisted of the subscales dampening and positive rumination, determined PA regulation. The Ruminative Response Scale (RRS-NL), consisted of the subscales brooding and reflection, determined NA regulation. There was a significant correlation found between NA regulation and depression and PA regulation and depression. Results showed that NA regulation was a more important contributor to depression than PA regulation, but looking at NA and PA regulation simultaneously, brooding, dampening and positive rumination made a unique contribution to depression. Gender was not found as a moderator between NA and PA regulation and depression. Concluding, the current study gave insight into the extent to which NA and PA regulation contributes to depression and suggested that NA and PA regulation are important factors associated with depression, which may be relevant to consider in treating depression. Suggestions for further research, limitations of the present study and implications for clinical practice were discussed.

Keywords: depression, negative affect (NA) regulation, positive affect (PA) regulation, brooding, reflection, dampening, positive rumination, gender, Response Style Theory

Introduction

According to the World Health Organization [WHO], depression is a worldwide mental health illness, affecting approximately 280 million people in 2019 (*Depression*, 2021). In the Netherlands, 18.7% of the Dutch population up to the age of 65 has suffered from depression at some point of their lives (de Graaf et al., 2010). The third leading contributor to the global disease burden is depression, and it is expected that it will rise to the first place by 2030 because depression has a major impact on the quality of life. (Mathers & Loncar, 2006). It also affects individuals for sustained periods and often early in life (Penninx et al., 2013). Identifying risk factors and underlying mechanisms in depression are specifically pressing and could lead to valuable implications for the development of effective curative and preventative treatments to reduce the major impact of depression on the quality of life.

Depression is a mental health disorder defined by an increase of negative affect [NA] as well as anhedonia, which refers to a relative absence of positive affect [PA] or reduced pleasure in daily activities (American Psychiatric Association 2013, p. 160). Difficulties with emotion regulation were a potential mechanism in the maintenance and development and recurrence of depression (Donofry et al., 2016). Individuals who were vulnerable for developing depression might use maladaptive emotion regulation strategies which increase or maintain depressive symptoms. Moreover, they might have difficulties with understanding, were less aware of, and had limited capacity to tolerate emotions. Therefore, problems with recovering from negative emotions might result in a constant depressed mood (Joormann & Gotlib, 2010). Research showed that individuals with a Major Depressive Disorder [MDD] used less adaptive emotion regulation strategies and more maladaptive emotion regulation strategies. Further, after recovering from MDD emotion regulation difficulties seem to persist (Joormann & Stanton, 2016). Emotion regulation difficulties included difficulties in downregulating NA and deficits in upregulating or maintaining PA (Forbes & Dahl, 2005; Shortt et al., 2016). The investigation of emotion regulation was an important research domain (Gross, 1999). Most of the research had focused on NA regulation but the value of investigating PA regulation was increasingly recognised (Dunn, 2012; Feldman et al., 2008; Wood et al., 2003). NA and PA were not each other's opposite, and the regulatory processes of NA and PA might not be very similar (Wood et al., 2003). Thus, investigating PA regulation could broaden the knowledge of depression, over and above existing knowledge about NA regulation.

In investigating depression, the study of NA regulation has had the most attention, with negative rumination as an important research subject. There were many different theories about negative rumination. According to the Response Style Theory (RST) negative rumination was defined as a passive and repetitive thinking style, in which one constantly ponders about one's depressive symptoms and possible causes and consequences of these symptoms (Nolen-Hoeksema, 1991). Negative rumination could be measured in many ways, but it was generally measured using the Ruminative Response Scale [RRS] (Nolen-Hoeksema et al., 1999). Negative rumination was a core mechanism in maintaining and activating depression (Nolen Hoeksema et al., 1994; Nolen-Hoeksema et al., 2008;

Watkins, 2008). Moreover, it was a robust finding that ruminating on the causes and meaning of sad feelings deepens and prolongs NA (Lyubomirsky & Nolen-Hoeksema, 1995). Treynor, Gonzalez, and Nolen-Hoeksema (2003) identified, using the RRS, two different forms of NA regulation which were brooding and reflection. Brooding seemed to be a more maladaptive form of NA regulation, whereas reflection was a more adaptive and not a strongly problematic form of NA regulation (Burwell & Shirk, 2007; Joormann et al., 2006; Raes & Hermans, 2008).

Besides NA regulation, there was a growing interest in examining PA regulation in depression (Dunn, 2012). One way of regulating PA had recently attracted research attention which was called dampening. Dampening was defined as the tendency to respond to a positive mood with mental strategies to reduce the intensity and duration of this positive mood (Feldman et al., 2008). For example, when an individual felt joyful, dampening implicated thinking that one did not deserve it or thinking about things which went wrong. Positive rumination was another way of PA regulation and was defined as 'the tendency to respond to PA with recurrent thoughts about positive self-qualities, positive affective experience, and one's favourable life circumstances' (Feldman et al., 2008, p. 509). The Responses to Positive Affect (RPA) questionnaire had been developed to assess people's PA regulation (Feldman et al., 2008). The RPA assessed dampening and two forms of positive rumination: emotion-focused rumination, which focusses on the current emotional state, and self-focused rumination, which focuses on aspects of positive self-qualities (Nelis et al., 2016). A recent study showed that there was a possible advantage of targeting PA instead of NA with treatment for depression (Craske et al., 2019). Further, PA regulation was likely to protect against the development of depression in individuals with high genetic vulnerability (Dunn, 2012). Concluding, not only investigating NA regulation, but also investigating PA regulation was important for understanding depression.

Most research on depression had looked at NA and PA regulation separately. Brooding was, compared to reflection, the most maladaptive form of NA regulation and was empirically associated with depressive symptoms (Armey et al., 2009; Burwell & Shirk, 2007; Schoofs et al., 2010). In contrast, reflection was negatively associated with depression over time, but positively associated with concurrent depression (Johnson et al., 2008; Treynor et al., 2003). A study which investigated the relation between PA regulation and depression using the RPA, showed that higher levels of dampening were associated with more concurrent depressive symptoms in students (Raes et al., 2009). Also, Raes and colleagues (2012) found that higher levels of dampening predicted concurrent depressive symptoms and depressive symptoms later in time. In addition, dampening was positively related to depression in a community sample (Nelis et al., 2015). Moreover, in comparison with non-depressed participants, depressed participants reported using dampening more frequently (Werner-Seidler et al., 2013). On the contrary, the coherence between positive rumination and depression was not as clear as the coherence between dampening and depression. Although some studies had found a negative relation between self-focused positive rumination and depression (Feldman et al., 2008), other studies have only found a negative relation between emotion-focused positive rumination and depression (Raes et al. 2009; Werner-Seidler

et al. 2013). In fact, one study did not find a relation at all between depression and the two forms of positive rumination (Johnson et al., 2008). The differences in these study findings could be due to the different samples, some studies used non-clinical samples and other studies used clinical samples.

The studies described above had examined the two separate relations between NA and PA regulation with depression. Limited research which considered NA and PA regulation simultaneously in relation to depression had been conducted. One study provided an examination of ruminative responses to NA and PA in students diagnosed with MDD. The findings showed that brooding and reflection correlated with depressive symptoms, and PA regulation did not correlate with depressive symptoms (Johnson et al., 2008). Moreover, Raes and colleagues (2012) examined to what extent NA and PA regulation, measured using RRS and RPA, predicted depression. Their longitudinal results suggested that PA regulation, especially dampening, predicted depressive symptoms over and above NA regulation. These findings suggested that in investigating depression more attention should be directed to PA regulation rather than solely focussing on NA regulation. Moreover, previous studies which investigated the relation between NA and PA simultaneously and depression are limited because of the non-clinical samples.

Besides investigating the relation between NA and PA regulation and depression, investigating gender differences in this relation could be valuable. Studies showed that women were more at risk for depression than men (de Graaf et al., 2010; Mezulis et al., 2011; Nuijen et al., 2018). This gender difference was a serious health disparity and was important to consider when investigating depression. The RST stated that gender differences in depression emerged partially because women tended to ruminate more than men (Nolen-Hoeksema, 1991). A meta-analysis, which compared 59 studies using the RRS, evaluated these gender differences in depression and NA regulation. The results showed that women scored higher on brooding and reflection than men (Johnson & Whisman, 2013). Regarding PA regulation, a two-year longitudinal study showed that girls scored higher on dampening and depressive symptoms and lower on self-focused positive rumination than boys. There was no gender difference in emotion-focused positive rumination Gomez-Baya et al., 2017). The second aim of this study was to examine if the relation between NA and PA regulation and depression was moderated by gender. If so, psychological treatments could be adjusted which may result in better treatment outcomes in depressed patients.

To extend previous studies, the first aim of the present study was to investigate the concurrent relationship between NA and PA regulation and depression in a large clinical sample. The second aim of the present study was to investigate whether gender was a moderator of the relationship between NA and PA regulation and depression. For the first hypothesis it was predicted that in line with the studies of Army and colleagues (2009), Burwell & Shirk (2007) and Schoofs and colleagues (2010) brooding was positively related to depression, and in line with the studies of Johnson and colleagues (2008) and Treynor and colleagues (2003) it was predicted that reflection was positively related to depression. For the second hypothesis, in line with the studies of Nelis and colleagues (2015) and Werner-Seidler and

colleagues (2013), it was predicted that dampening was positively related to depression, and in line with the study of Feldman and colleagues (2008), positive rumination was negatively related to depression. Given the mixed findings of the two forms of positive rumination there was no expectation about these two forms related to depression. According to the study of Raes and colleagues (2012) there was an implication that, when looking at NA and PA regulation simultaneously, PA regulation might be as important, or maybe even more important, as a contributor to depression than NA regulation. Therefore, the third hypothesis was that PA regulation contributed to a greater extent to depression than NA regulation. Previous studies did not formulate hypotheses for the moderating effect of gender between depression and NA and PA regulation, so this was examined in the present study for exploratory reasons.

Methods

Participants

The present study included participants who were patients receiving treatment for mood disorders at Altrecht, an outpatient clinic in Utrecht for specialised mental health care, during the period of March 2014 and March 2022. Patients who were older than eighteen years and met the criteria for MDD or dysthymia according to the DSM-5 were included for a specialised depression assessment (in Dutch: Gespecialiseerd Depressie Assessment, GDA). Patients were excluded when the mental health state was too severe or in case of limited Dutch proficiency.

Instruments

Inventory of Depressive Symptomatology (IDS-SR). The IDS-SR is a self-report questionnaire which assessed the severity of depressive symptoms in the past seven days following the nine criteria of the DSM-5 (American Psychiatric Association, 1994; Rush et al., 1986). It consisted of 30 items which were rated on a scale from 0 to 3, and the total score of all items ranged from 0 to 84. A total score of 0 – 13 represented no depression, 14 – 25 represented mild depression, 26 – 38 represented moderate depression, 39 – 48 represented severe depression and a total score above 49 represented very severe depression (Gili et al., 2011). An example item from de IDS-SR was 'Quality of your mood', where 0 = the mood which I experience is often a normal mood, 1 = my mood is gloomy, but this gloom is very similar to sadness, 2 = my mood is gloomy, but this is somewhat different from what I would feel with grief, 3= my mood is gloomy, but this gloom feels quite different from sadness. The psychometric qualities of the IDS-SR were highly acceptable according to Rush and colleagues (1996). The present study found an excellent internal consistency with $\alpha = .85$.

Ruminative Response Scales – Dutch version (RRS-NL). The RRS was a self-report questionnaire which assessed ruminative responses to depression. It consisted of 22 items, which were rated on a four-point scale (ranging from 1 = almost never to 4 = almost always) and assessed how a respondent reflected on their thoughts or actions when feeling sad or depressed. (Nolen-Hoeksema et al., 1999). The 22-item RRS was commonly criticized, therefore Treynor and colleagues (2003) removed 12 items linked to depression to create a questionnaire measuring rumination unrelated to depressive symptoms. A two-dimensional model of rumination was discovered after performing a principal components analysis on the remaining 10 items. In this study, the Dutch version with 10 items was used (Schoofs et al., 2010). The questionnaire consisted of two separate rumination subscales, labelled Brooding (five items, e.g., "I think 'Why do I always react this way?") and Reflection (five items, e.g., "I analyse recent events to try to understand why I am depressed"). The present study found an internal consistency for the two subscales Brooding and Reflection were good and acceptable, with $\alpha = .75$ and $\alpha = .62$.

Responses to Positive Affect questionnaire – Dutch version (RPA-NL). The RPA-NL, developed by Feldman, Joormann and Johnson (2008), was a self-report questionnaire which assessed responses to positive affective states. It consisted of 17 items which were rated on a four-point scale (ranging from 1 = almost never to 4 = almost always). The questionnaire used in the present study consisted of two subscales, labelled dampening which consisted of 8 items (e.g., 'My streak of luck is going to end soon'), and positive rumination which consisted of 9 items (e.g., 'It makes me think I am achieving a lot in my life'). The psychometric qualities of the RPA-NL were adequate according to Raes and colleagues (2009). The present study found an excellent internal consistency for the two subscales dampening, and positive rumination, with $\alpha = .85$, $\alpha = .88$.

Procedure

For the current study, the data were gathered during the GDA. This was part of the standard procedure for patients who completed the intake procedure and started treatment at Altrecht. The IDS-SR used for this study was part of the intake procedure. The researchers invited the patients directly to participate and explained the aim of the GDA, which was to collect data for research purposes and to improve the patient's treatment. When the patient voluntarily chose to participate, an appointment was made with the researcher at the outpatient clinic. Before the appointment, the researcher sent four online questionnaires and information about the GDA by email. The online questionnaires took about 10-15 minutes to complete and consisted of the RPA-NL (Feldman et al., 2008), RRS-NL (Raes et al., 2003), the Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1989) and the Mood Disorder Questionnaire (MDQ; Postma & Schulte, 2008). During the appointment the patient signed an informed consent form and underwent a semi-structured interview, which consisted of Checklist Staging and Profiling, the Mini- International Neuropsychiatric Interview (MINI; Overbeek et al., 1999) and the Measure to Elicit Positive Future Goals and Plans (MEPGAP; Vincent et al., 2004). This took one hour and a half on average. After the appointment, a brief report regarding the GDA results was stored in the electronic patient's dossier and was sent to the therapist to provide additional information about the patient. The data used for research purposes were anonymous.

Design and statistical analyses

The present study used a cross-sectional design. Statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp, 2017). A power analysis was not performed, because it could be misleading as participants were already recruited before this study (Field, 2013; Gilbert & Prion, 2016). A two-tailed significance level of $p < .05$ was used. The cases with non-valid and missing values in the outcome variables were deleted. Using boxplots, potential outliers were visualized and removed when it was probably an incorrectly entered score. Other potential

outliers were also removed because the presence of outliers could question the robustness of the results and jeopardize the assumptions of parametric tests (Leys et al., 2019). Moreover, multiple regression analyses (MRAs) were sensitive to outliers and should be removed to lessen their impact on the results (Allen et al., 2014).

First, the relationships between NA and PA regulation and depression were separately tested with a Pearson's *r* correlation. Prior to this, corresponding assumptions were checked. For a parametric correlation, the effect size was determined with $r = .10 – .29$, $r = .30 – .49$ and $r \geq .50$ representing small, medium, and large effect sizes respectively (Cohen, 1988). If the assumptions were violated, a non-parametric test was performed. A nonparametric correlation was determined with $\rho < .19$, $\rho = .20 – .39$, $\rho = .40 – .59$, $\rho = .60 – .79$ and $\rho \geq .80$ presenting very weak, weak, moderate, strong, and very strong correlations.

Second, to test the third hypothesis, two hierarchical MRAs were employed. Prior to this, corresponding assumptions were tested. The depended variable in both MRAs was depression. The method used was enter. The first MRA tested the proportion of variance which NA regulation explained in depression when controlling for PA regulation. The independent variables added in step one were brooding and reflection. In step two, dampening and positive rumination were added. The second MRA tested the proportion of variance which PA regulation explained in depression when controlling for NA regulation. The independent variables added in step one were dampening and positive rumination. In step two, brooding and reflection were added.

Third, two moderation analysis were conducted using 'Process', version 3.0 (Hayes, 2017), to test whether gender was a moderator on the relationship between NA and PA regulation and depression. Assumptions of a multiple regression analysis were tested and checked. Al four predictors were mean centred, because it guaranteed that the coefficients of the variables would be interpretable within the data range (Hayes, 2012). Using a Bonferroni correction, effects with $p < .01$ were defined as significant. The significance level of $p < .01$ occurs from $p = .05$ divided by the number of tests, which was 4. A Bonferroni correction was used to avoid a type I error and carrying out multiple tests without preplanned hypotheses based on existing studies (Armstrong, 2014). The effect size was determined with $\boldsymbol{f}^2 = .02 – .14$, $\boldsymbol{f}^2 = .15 – .34$, and $\boldsymbol{f}^2 \geq .35$ presenting small, medium, and large effect sizes (Cohen, 1988).

Results

Demographic variables and sample characteristics

At the baseline N = 460 patients participated in the GDA. A total N = 374 of the patients completed the GDA procedure, 166 were male and 208 were female with age varying between 23 and 63 years (M = 39.45, SD = 10.79). The mean age of the female patients was M = 38.25 (SD = 10.73) and of the male patients M = 40.96 (SD = 10.72). The total mean score on the IDS-SR was 44 indicating that on average these patients were severely depressed (Gili et al., 2011). The depression severity, highest completed education level, country of origin and social status were presented in Table 1.

Table 1

Depression severity according to the IDS-SR, highest completed edsucation level, country of origin and social status for the total sample, males, and females

	Male *n* (%)	Female *n* (%)	Total *n* (%)
Depression severity according to IDS-SR [a]			
Mild	14 (8.4%)	16 (7.7%)	30 (8%)
Moderate	41 (24.7%)	48 (23.1%)	89 (23.8%)
Severe	53 (31.9%)	51 (24.5%)	104 (27.8%)
Very severe	56 (33.7%)	89 (42.8%)	145 (38.8%)
Highest completed education level			
Primary school	13 (7.8%)	12 (5.8%)	25 (6.7%)
Lts/lbo [b]	18 (10.8%)	11 (5.3%)	29 (7.8%)
Mavo/vmbo [b]	20 (12%)	29 (13.9%)	49 (13.1%)
Mbo [b]	49 (29.5%)	79 (38%)	128 (34.2%)
Havo/vwo [b]	20 (12%)	19 (9.1%)	39 (10.4%)
Hbo/univeristy [b]	42 (25.3%)	57 (27.4%)	99 (26.5%)
Other	4 (2.4%)	1 (0.5%)	4 (1.1%)
Country of origin			
Netherlands	128 (77.1%)	154 (74.1%)	281 (75.1%)
Morocco	15 (9.0%)	19 (9.1%)	34 (9.1%)
Suriname	3 (1.8%)	7 (3.4%)	10 (2.7%)
Turkey	8 (4.8%)	8 (3.9%)	16 (4.3%)
Other	12 (7.3%)	20 (9.5%)	33 (8.8%)
Social status			
Living with partner and children	58 (34.9%)	62 (29.8%)	120 (32.1%)

Living with partner	25 (15.1%)	44 (21.2%)	69 (18.4%)
Living with children	8 (4.8%)	27 (13%)	35 (9.4%)
Living alone	43 (25.9%)	46 (22.1%)	89 (23.8%)
Living with someone else	26 (15.7%)	19 (9.1%)	45 (12.0%)
Divorced	4 (2.4%)	7 (3.4%)	11 (2.9%)
Divorced and living with children	1 (0.6%)	1 (0.5%)	3 (0.8%)

Note. [a] Inventory of Depressive Symptomatology Self Report. [b] Various levels in Dutch (post-)secondary education. lts/lbo is the predecessor of preparatory secondary vocational education, mavo/vmbo is preparatory secondary vocational education, mbo is secondary vocational education, havo is higher general secondary education, vwo is preparatory university education and hbo is higher vocational education.

Relationships between depression and NA regulation, and between depression and PA regulation

Prior to calculating the correlations, the assumptions of normality, linearity and homoscedasticity were assessed. The assumptions of independence and normality were met, but the assumptions of homoscedasticity and linearity were violated. For this reason, Spearman ρ correlations were calculated. The results of the bivariate Spearman's ρ correlation were shown in table 2. The hypotheses were accepted or rejected based on this table. The Spearman's ρ correlation between depression and brooding was significant, ρ (374) = .36, $p < .001$, indicating a weak positive correlation. There was a very weak significant positive correlation between depression and reflection, ρ (374) = .14, $p < .009$. The Spearman's ρ correlation between depression and dampening was significant, ρ (374) = .29, $p < .001$, indicating a weak positive correlation. There was a very weak negative correlation between depression and positive rumination, ρ (374) = -.18, $p < .001$. These findings suggested that the first and second hypothesis were accepted.

Table 2.

Spearman's ρ correlations between depression, brooding, reflection, dampening and positive rumination

Variable	1.	2.	3.	4.	5.
1. Depression	1				
2. Brooding	.362**	1			
3. Reflection	.135**	.417**	1		
4. Dampening	.292**	.529**	.247**	1	
5. Positive rumination	-179**	-.010	.151**	-.013	1

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Assumptions hierarchical MRAs

Prior to interpreting the results of the MRAs, several assumptions were checked. First, stem-and-leaf plots and boxplots indicated that each variable in the regression was normally distributed. There were no univariate outliers. Second, inspection of the normal probability plot of standardised residuals as well as the scatterplot of standardised residuals against standardised predicted values indicated that the assumptions of normality, linearity and homoscedasticity of residuals were met. Third, Mahalanobis distance did not exceed the critical x^2 for $df = 4$ (at $\alpha = .001$) of 18.47 for any cases in the data file, indicating that multivariate outliers were not of concern. Fourth, relatively high tolerances for all predictors in the regression model indicated that multicollinearity would not interfere with the ability to interpret the outcome of the MRAs.

MRA's for NA and PA regulation

The results of the MRAs were shown in table 3 and 4. In step 1 of the first hierarchical MRA, brooding and reflection accounted for a significant 13% of the variance in depression, $R^2 = .13$, F (2, 371) = 27.96, $p < .001$. In step 2, dampening and positive rumination were added, and accounted for an additional 4% of variance in the depression $\Delta R^2 = .04$, ΔF (2, 369) = 8.29, $p = < .001$. In step 1 of the second hierarchical MRA, dampening and positive rumination accounted for a significant 9% of the variance in depression, $R^2 = .09$, F (2, 361) = 19.04, $p < .001$. In step 2, brooding and reflection were added, and accounted for an additional 6% of variance in the depression $\Delta R^2 = .05$, ΔF (2, 359) = 12.54, $p < .001$. According to these results, the third hypothesis was rejected because NA regulation contributed to a greater extent to depression than PA regulation. Looking at all the predictors simultaneously, brooding, dampening and positive rumination contributed a unique proportion of the variance explained in depression.

Table 3.

Regression analysis for depression, brooding and reflection

	B [95% CI]	SE B	β	*p*	R^2	ΔR^2	F
Step 1					.13	.13	27.95
Brooding	7.46 [5.32, 9.60]	1.09	0.36	**<.001**			
Reflection	-0.14 [-2.48, 2.21]	1.19	-0.01	**.909**			
Step 2					.17	.04	18.67
Brooding	5.92 [3.49, 8.36]	1.24	0.29	**<.001**			
Reflection	0.55 [-1.78, 2.89]	1.19	0.03	**.643**			
Dampening	2.31 [0.62, 4.55]	1.14	0.11	**.044**			
Positive rumination	-3.92 [-6.17, -1.68]	1.14	-0.17	**<.001**			

Table 4.

Regression analysis for depression, dampening and positive rumination

	B [95% CI]	SE B	β	*p*	R^2	ΔR^2	F
Step 1					.11	.11	21.70
Dampening	5.59 [3.64, 7.54]	0.99	0.28	**<.001**			
Positive rumination	-3.69 [-5.98, -1.41]	1.16	-0.16	**.002**			
Step 2					.17	.06	16.40
Dampening	2.31 [0.62, 4.55]	1.14	0.11	**.044**			
Positive rumination	-3.92 [-6.17, -1.68]	1.14	-0.17	**<.001**			
Brooding	5.92 [3.49, 8.36]	1.24	0.29	**<.001**			
Reflection	0.55 [-1.78, 2.89]	1.19	0.03	**.643**			

Moderating effect of gender

The assumptions of normality, multicollinearity, multivariate outliers and normality, linearity, and homoscedasticity of residuals for a multiple regression analysis were met. The results of the moderating effect of gender on the relation between depression and NA regulation were shown in table 5 and 6. Regarding brooding, the overall model was significant, $R^2 = .36$, $F\ (3, 370) = 18.71$, $p < .01$. The effect could be considered as "large" ($\boldsymbol{f}^2 = .56$). Regarding reflection, the overall model was not significant, $R^2 = .17$, $F\ (3, 370) = 3.61$, $p = .014$. The interactions between the brooding and gender and between reflection and gender were not significant, indicating that the relationship between depression and NA regulation was not moderated by gender.

Table 5.

Linear model of predictors brooding and gender of depression

	b [95% CI]	*SE B*	*t*	*p*
Constant	43.89 [42.50, 45.09]	0.66	66.58	< .001
Brooding (centred)	7.33 [5.36, 9.30]	1.00	7.32	< .001
Gender	0.66 [-1.94, 3.27]	1.32	0.50	.617
Brooding x gender	0.59 [-3.39, 4.58]	2.03	0.30	.770

Table 6.

Linear model of predictors reflection and gender of depression

	b [95% CI]	*SE B*	*t*	*p*
Constant	43.83 [42.48, 45.19]	0.69	63.53	< .001
Reflection (centred)	3.28 [1.02, 5.54]	1.15	2.86	.005
Gender	2.00 [-0.72, 4.74]	1.39	1.45	.149

Reflection x gender	1.95 [-2.60, 6.50]	2.31	0.84	.401

The results of the moderating effect of gender on the relation between depression and PA regulation were shown in table 7 and 8. Regarding dampening, the overall model was significant, R^2 = .29, F (3, 370) = 11.17, p < .01. The effect could be considered as "large" ($\boldsymbol{f}^2$ = .41). Regarding positive rumination, the overall model was significant, R^2 = .19, F (3, 370) = 4.45, p < .01. The effect could be considered as "medium" ($\boldsymbol{f}^2$ = .23). The interaction between the dampening and gender and between positive rumination and gender was not significant, indicating that the relationship between depression and PA regulation was not moderated by gender.

Table 7.

Linear model of predictors dampening and gender of depression

	b [95% CI]	*SE B*	*t*	*p*
Constant	43.82 [42.50, 45.14]	0.67	65.22	< .001
Dampening (centred)	5.63 [3.64, 7.63]	1.01	5.56	<.001
Gender	1.40 [-1.26, 4.06]	1.35	1.03	.302
Dampening x gender	0.21 [-3.86, 4.28]	2.07	0.10	.920

Table 8.

Linear model of predictors positive rumination and gender of depression

	b [95% CI]	*SE B*	*t*	*p*
Constant	43.80 [42.45, 45.16]	0.69	63.65	< .001
Positive rumination (centred)	-4.02 [-6.40, -1.64]	1.21	-3.32	.001
Gender	2.14 [-0.59, 4.86]	1.39	1.54	.124
Positive rumination x gender	1.27 [-3.50, 6.04]	2.43	0.52	.602

Discussion

The present study aimed to examine the relationship between NA and PA regulation and depression, and explicitly to what extent NA and PA regulation contributed to depression. It also examined whether gender possibly influenced the relation of NA and PA regulation and depression. Hypotheses were partially supported by study results. The explanations of the current findings were discussed below.

The results of the first hypothesis, which suggested that brooding and reflection were positively related to depression, were consistent with prior studies of Army and colleagues (2009), Burwell & Shirk (2007), Schoofs and colleagues (2010), Johnson and colleagues (2008) and Treynor and colleagues (2003). The results of the current study showed that inadequate NA regulation was related with depression, which meant that the more someone used inadequate NA regulation, the more depressed someone was. In addition, these results are consistent with the RST and with the general idea that inadequate NA regulation maintains clinical depressions. Furthermore, the results of the second hypothesis were consistent with prior studies of Nelis and colleagues (2015), Feldman and colleagues (2008) and Werner-Seidler and colleagues (2013), which suggested that dampening was positively related, and positive rumination was negatively related to depression. This meant that the more someone dampened and the less someone ruminated their PA the more depressed someone was. Overall, these results suggested that NA and PA regulation were important factors in explaining depression.

From this follows the first aim of the present study to examine whether PA regulation could be as important or maybe even more important, as a contributor to depression than NA regulation. The results of the third hypothesis were in contrast with the prior study of Raes and colleagues (2012), which suggested that PA regulation contributed to a greater extent to depression than NA regulation. The results of the present study suggested that NA regulation was a more important contributor to depression than PA regulation. An explanation for this was that it could be that the effect of NA and PA regulation was due to the degree of NA and PA itself. A study which examined the moderating effect of NA and PA on depression implied that students experiencing low levels of NA and high levels of PA scored lower on depression than students experiencing high levels of NA and low levels of PA. This suggested that different measures of NA and PA were related to different severity levels of depression indicating that NA might increase depression when an individual reported low PA (Nima et al., 2013). Therefore, the relation between NA and PA regulation might be moderated by how much NA and PA one had of itself.

However, besides NA regulation, PA regulation was also an important contributor to depression. The current findings suggested that, when looking at NA and PA regulation simultaneously, brooding, dampening and positive rumination were important contributors to depression. These results ran counter to the findings of Johnson and colleagues (2008), which found that only NA regulation contributed to depressive symptoms. Yet, caution is needed before drawing conclusions about which one of the three predictors contributed the most to depression, because MRAs might ignore the relative importance of a

predictor and focusing solely on beta coefficients when describing a contribution of a predictor might lead to misunderstandings (Petrocelli, 2003). Because beta coefficients were based on a predictors' relationship with the dependent variable as well as all other predictors in the model, it may mislead the perception of to what extent predictors contribute to the dependent variable when predictors are correlated (Kraha et al., 2012). Nonetheless, it could be concluded that from these results of the current study PA regulation could have implications for understanding depression and highlighting the importance of investigating PA regulation in addition to research on NA regulation (Wood et al., 2003; Raes et al., 2012). In terms of clinical implications, these results indicated that clinicians should also pay attention to how depressed patients and those at risk of depression regulate their PA, rather than focusing solely on NA regulation.

Further, for exploratory reasons, a secondary aim of the present study was to investigate if the relationship between depression and NA and PA regulation differed between men and women. This was not the case, meaning that the relation between NA and PA regulation and depression did not differ for men and women. These results were in contrast with the RST, the prior study of Gomez-Baya and colleagues (2017), and with the prior meta-analysis of Johnson and Whisman (2013), which found that depressed women scored higher on reflection and brooding than depressed men. Yet, these results also showed that the difference in regulating NA in depression between men and women is minor in adults. Clinical and non-clinical samples were both included because according to the RST gender differences in regulating NA did not change in magnitude because of a diagnostic status. A possible explanation for not finding a gender difference in the associations of NA and PA regulation with depression could be that NA and PA regulation did not change much based on a diagnosis, but it could matter to what extent someone is depressed. In the present study the participants were severely depressed which may influence the gender differences in NA and PA regulation and depression. It follows from this that caution is needed with generalizing the results of the current study to other groups, even if a group is diagnosed with depression, because the participants were diagnosed with a severe depression and treated in specialized mental health care. Another possible explanation for not finding a gender difference could be that gender differences in depression peaks in the adolescence and narrows in adulthood (Salk et al., 2017). As a result of this gender differences in the current study could be minor because all participants were adults. Concluding, the findings of the present study suggested that it is not necessary to adjust psychological treatments based on NA and PA regulation for depressed men and women.

Although caution is needed to generalize the present results to participants treated in basic mental health care, a strength of this study is the large clinical sample which allows findings to be generalized to other specialized mental healthcare treating depression in the Netherlands. In addition, because of the large clinical sample the findings are more accurate and reliable. Moreover, as far as known, this is the first study which examined the relationship between NA and PA regulation together and depression in a large clinical sample. Consequently, this study gives insight into the extent to which

NA and PA regulation contributes to depression, which might be relevant to consider in treating depression targeting NA and PA regulation simultaneously.

As stated above, the first limitation of the current study was the absence of a measure of NA and PA. Based on the study of Nima and colleagues (2013), it could be that the effect of NA and PA regulation was moderated by the degree of NA and PA one had of itself. Second, the cross-sectional design of this study was a limitation. As a result, it could not be determined whether brooding, reflection, dampening, or positive rumination contributed the most to a depression. Further, a temporal relationship between NA regulation and depression and PA regulation and depression could not be examined. Finally, in the Netherlands, a considerable number of individuals suffering from depression were treated in basic mental healthcare and have symptoms that were distinct from the participants in this study which were more likely to have comorbid mental disorders. As a result, the findings could not be generalized to the entire population of depressed people.

Despite the limitations stated above, the current study extended prior research by showing that NA regulation contributed more to depression compared to PA regulation. However, PA regulation was also an important contributor to depression to consider. Therefore, it could be concluded that NA and PA regulation were important factors in understanding depression in a clinical sample. The current findings, which suggested paying attention to NA and PA regulation simultaneously in depression, was an important indication and represented a next step towards future research as well as for psychological treatment. Future studies should add such NA and PA measures to investigate if regulating PA and NA, in addition to PA and NA itself, contribute to depression and to measure the moderating effect of NA and PA regulation and depression. Also, future research may need to examine how NA and PA regulation interacts with other depression risk and protective factors to better understand gender differences in depression and to improve mental health care for depression.

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