Journal of Affective Disorders 210 (2017) 66–71

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

The role of affect in predicting depressive symptomatology in remitted recurrently depressed patients☆

M. de Jonge[a,*], J.J.M. Dekker[a,b], M.J. Kikkert[a], J. Peen[a], G.D. van Rijsbergen[c], C.L.H. Bockting[d]

[a] Department of Research Arkin, Amsterdam, The Netherlands
[b] Department of Clinical Psychology, Vrije Universiteit, Amsterdam, The Netherlands
[c] Department of Clinical Psychology, University of Groningen, Groningen, The Netherlands
[d] Department of Clinical Psychology, University Utrecht, Utrecht, The Netherlands

ARTICLE INFO

Keywords:
Affect
Mood
Depressive symptomatology
Relapse
Recurrence
Remitted

ABSTRACT

Background: Major depressive disorder is an emotional disorder. It is important to improve our understanding of the role of affect in relapse/recurrence of depression. Therefore, this study examines whether affect plays a role in prospectively predicting depressive symptomatology and if there are indications for emotional scarring as a consequence of undergoing depressive episodes.

Methods: In 107 patients remitted from recurrent depression affect was examined in predicting depressive symptomatology as measured with the Inventory of Depressive Symptomatology – Self Report. Affect was measured with the Positive and Negative Affect Schedule and with a one item Visual Analogue Mood Scale. Indication of emotional scarring was examined by comparing number of previous depressive episodes to levels of affect.

Results: Less positive affect as assessed after remission predicted increased depressive symptomatology six months later, even after we controlled for baseline symptomatology. Negative affect also predicted depressive symptomatology six months later, but not after controlling for baseline depressive symptomatology. No relationship was found between affect and number of previous episodes.

Limitations: All participants in this study had two or more previous depressive episodes and received CBT during the acute phase of their depression. The instruments that measured mood and affect were administered within 4 weeks of each other.

Conclusions: Positive affect and negative affect as assessed after remission in recurrent depression can predict depressive symptomatology. Especially positive affect seems to play an independent role in predicting depressive symptomatology. Directly targeting positive affect in relapse prevention during remission might be a way to enhance treatment effects.

1. Introduction

Depression is the most disabling psychiatric disorder worldwide when measured in years lived with disability (Whiteford et al., 2013). According to epidemiological studies, the annual prevalence of major depressive disorder (MDD) in the general population varies from 4–6% (Dekker et al., 2008; Peen et al., 2007), and lifetime prevalence rates are estimated at more than 16% (Kessler et al., 2005). The large majority of individuals with MDD experience more than one episode, and the probability of another episode increases with each relapse or recurrence (Hardeveld et al., 2013; Solomon et al., 2000). The most well-known risk factors for relapse or recurrence are the number of previous episodes and residual symptoms after remission (Fava et al., 2004; Judd et al., 1998). Affect has also been linked to relapse and recurrence of MDD after remission, but it remains unclear whether differentiating between positive and negative affect is helpful in predicting relapse and recurrence (van Rijsbergen et al., 2012). Therefore, this study explored the role of positive affect and negative affect in predicting depressive symptomatology, and by doing so detecting easily assessable markers for relapse and recurrence.

Affect is an umbrella term as it covers both mood and emotion, it refers to valenced (good versus bad) states (Frijda, 1994; Gross, 2010). Mood is a type of affective state which reflects a feeling tone, it is diffuse, and global (Siemer, 2005). Sad mood is one of the key

☆ *Trial registration:* Netherlands Trial Register (NTR): 2599.

* Corresponding author.
E-mail address: margo.de.jonge@arkin.nl (M. de Jonge).

http://dx.doi.org/10.1016/j.jad.2016.12.015
Received 12 July 2016; Received in revised form 4 October 2016; Accepted 17 December 2016
Available online 18 December 2016
0165-0327/

symptoms of a depressive episode, but also a risk factor for relapse and recurrence after remission (van Rijsbergen et al., 2012). Affect plays an important role in both the onset of depression and in the course of depression. Positive affect has a protective affect against the onset of depression, whereas negative affect can predict the onset of depressive symptoms up to ten years (Ames et al., 2015; Charles et al., 2013). Depressed patients respond better to treatment when they have more positive affect persistence at baseline and early improvement of positive affect during the first week predicts treatment response better than negative affect (Geschwind et al., 2011; Hohn et al., 2013).

Remitted depressed patients differ from never depressed patients on both positive affect and negative affect. O'Hara et al. (2014) showed that remitted previously depressed students experienced less positive affect than never depressed students when undergoing stress. This was in line with previous research that showed that remitted previously depressed students had more maladaptive responses on positive affect than never depressed students (Werner-Seidler et al., 2013). Negative affect fluctuations predicted depressive symptomatology in remitted previously depressed female patients (Wichers et al., 2010). Moreover, van Rijsbergen et al. (2012, 2015) found that negative affect, as measured by a simple one-item sad-mood scale in patients with two or more previous episodes, could predict recurrence of depression. To our knowledge, the results of van Rijsbergen et al. (2015) have not yet been replicated. Therefore, the current study explored whether affect as measured by a one item sad-mood scale could predict depressive symptomatology over a period of six months. Additionally, we differentiated between positive and negative affect in predicting depressive symptomatology to assess whether it is important to differentiate between the two.

The relationship between affect and the number of depressive episodes is largely unknown. To our knowledge, only one study has explored this. van Rijsbergen et al. (2015) found that remitted patients with more previous depressive episodes experienced higher levels of negative affect. This might be indicative of scarring, as a result of one or more previous major depressive episodes (MDEs). Scarring means that experiencing an episode of depression is considered to produce a change in underlying causal factors that increase the risk of future episodes (Bockting et al., 2015; Burcusa and Iacono, 2007). Although, given that there was no assessment before the first onset of depression, it might also be accounted for by individual differences in premorbid vulnerability. Suggesting that individuals at high risk for multiple episodes already possess certain characteristics before their first episode that make them prone to recurrent depression (Bockting et al., 2015).

This study examined, I) whether lower levels of positive affect, higher levels of negative affect and affect measured by a one item sad-mood scale can predict return of depressive symptomatology individually and combined over a period of six months, II) whether these results remain the same after controlling for baseline depressive symptomatology, III) whether specific affect items can predict depressive symptomatology over a period of six months, IV) whether a higher number of previous MDEs is associated with higher levels of negative affect, higher levels of sad mood and lower levels of positive affect.

2. Method

2.1. Design

This study uses data from a randomized controlled trial examining the effectiveness of Preventive Cognitive Therapy (PCT) in the prevention of relapse in recurrent depression (de Jonge et al., 2015). Patients received standard Acute Cognitive Therapy before entering the study. To prevent any interaction from the intervention, only the control group was used. When relapse or recurrence occurred during the course of the study, treatment was provided if necessary at one of our outpatient clinics. The study protocol was approved by the Medical Ethical Committee, Stichting Medische-Ethische Toetsingscommissie Instellingen Geestelijke Gezondheidszorg (METiGG), and all patients provided informed consent prior to participation. The trail was conducted in compliance with the Declaration of Helsinki (World Medical Association, 2013). More detailed information about the study can be found elsewhere (de Jonge et al., 2015).

2.2. Participants

Inclusion criteria were patients, a) who had at least two previous MDEs, b) who were currently in remission according to DSM-IV criteria, for at least two months as assessed by the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (Spitzer et al., 1992), c) who had none too mild depressive symptoms defined as a current score of < 14 on the 17 item Hamilton Depression rating scale, d) who have received prior cognitive therapy, with a minimum of eight sessions, e) who are fluent in Dutch. Exclusion criteria were patients with, a) mania or hypomania, a history of bipolar illness or any psychotic disorder (current and previous), b) current alcohol or drugs misuse, c) acute predominant anxiety disorder.

2.3. Measures

2.3.1. Remission status and depressive symptomatology

Remission status was determined using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (Spitzer et al., 1992). In addition, the severity of depressive symptomatology/level of residual symptoms was measured by using the Inventory of Depressive Symptomatology – Self Report (IDS-SR). The Dutch translation of the 30-item IDS-SR was used to assess levels of depressive symptomatology. The IDS-SR is a self-report measure on which patients rate their symptoms on a scale of zero to three. The IDS-SR rates all DSM-IV core symptom domains including mood, cognitive and psychomotor symptoms, but also commonly associated symptoms including anxiety. The IDS-SR has excellent psychometric properties with a Cronbach's alpha of .94 (Rush et al., 1996).

2.3.2. Previous MDEs

Number of previous MDEs was determined using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) and the life-chart (Spitzer etal., 1992). The assessments where done by trained assessors who attended regular consensus meetings to enhance inter-rater agreement.

2.3.3. Sad mood

Sad mood was assessed by a one item Visual Analogue Mood Scale (VAMS). Patients were asked to rate their current mood on a digital version of a Visual Analogue Mood Scale (VAMS) administered online (van Rijsbergen etal., 2012). Patients received the following instruction: 'please rate your current mood.' The scale consisted of a line, with 'happy' on the left side, and 'sad' on the right side. Patients rated their current mood state on the scale, therefore a higher score implied more current sad mood. The VAMS was used in previous research examining the effect of sad mood on relapse and recurrence (van Rijsbergen et al., 2012, 2015).

2.3.4. Positive affect and negative affect

Positive affect and negative affect were assessed by using the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988). Patients were asked to rate their current mood on a 5 point Likert scale. The PANAS consist of 10 positive items that represent PA and 10 negative items that represent NA. PA consists of; enthusiastic, interested, determined, excited, inspired, alert, active, strong, proud and attentive. NA consists of; scared, afraid, upset, distressed, jittery, nervous, ashamed, guilty, irritable and hostile. The Dutch version was used, which has reasonable psychometric properties with a

Cronbach's alpha of .87 for the NA scale and .77 for the PA scale (Engelen et al., 2006). The PANAS was administered four weeks after the baseline measurements.

2.4. Procedure

Upon entry in the study, patients were followed for 15 months. The SCID-I and HDRS were administered at baseline via telephone- or face to face interviews. The VAMS, IDS-SR, and PANAS were administered online, which patients could access through a personalized hyperlink. The IDS-SR was administered at baseline and at 6 months, the VAMS was administered at baseline and the PANAS was administered after 4 weeks.

3. Data analysis

All statistical analyses were conducted using SPSS Statistics for Microsoft Windows version 22, a computer software package for statistical analysis (SPSS Statistics for Windows, 2008). Analyses were done two-tailed with a probability level of $p < .05$. Multiple imputation was used to account for the 13.1% data that was missing. We used 50 imputations for the analyses and combined according to Rubin's rules (Rubin, 1987). We compared the results of the multiple imputation to the analyses done over the completers group (N=70) and the results were highly similar. There were two variables that showed slight changes in probability levels which led to a change in significance, both are mentioned in the results. Negative affect and depressive symptomatology at baseline were not normally distributed, therefore, they were square root transformed.

First, a linear regression analysis was used to assess the relationship between positive affect, negative affect, sad mood, and depressive symptomatology at six months. Depressive symptomatology at six months was the dependent variable and positive affect, negative affect, and sad mood the independent variables. The independent variables were all individually entered in the model. All assumptions for regression analysis were met. Then, the independent variables were combined to create different models to assess the added value of each variable combined with each other. The last model contained all the independent variables.

Second, a multiple regression, enter step method was used to control for baseline depressive symptomatology. Therefore, baseline depressive symptomatology was entered first. Secondly, positive affect, negative affect, and sad mood were individually entered. Depressive symptomatology at six months was the dependent variable. The final model consisted of positive affect, negative affect, sad mood, and baseline depressive symptomatology as the independent variables.

Third, a multiple regression analysis, backward step method was used to explore the influence of different positive affect and negative affect items on depressive symptomatology at six months. We used the completers dataset (n=70) for these analyses due to the explorative nature of these analyses. The first model consisted of only positive affect items. The second model consisted of only negative affect items. The third model combined all the items of positive affect and negative affect. The last model consisted of all the positive affect and negative affect items with the addition of the one item sad-mood scale as an item. A power analysis was conducted for all the models to ensure that the sample size was sufficient. Power was set at .80 with a probability level of $p < .05$. The sample size was sufficient for model two, three and four. However, model one lacked power which meant a deficit of 10 participants.

Finally, to examine the relationship between positive affect, negative affect, affect measured by the one item sad-mood scale and previous MDEs, a Spearman's Rho correlation was used.

Table 1
Participant's demographic and clinical characteristics.

Characteristic	N	Descriptive
Age, mean (S.D.)	107	44.7 (11.3)
Gender	107	
Male, n (%)		34.6
Female, n (%)		65.4
Married or registered partnership, n (%)	107	35 (32.7)
Cohabitating, n (%)	107	60 (56.0)
Patients on antidepressants, n (%)	107	34 (31.8)
Previous MDEs, median (IQR)	107	3 (2)
Age of first onset, mean (S.D.)	107	25.8 (12.8)
Severity last MDE[a]	107	
Mild, n (%)		12 (11.2)
Moderate, n (%)		50 (46.7)
Severe, n (%)		45 (42.0)
Positive affect (PANAS)[b], mean (S.D.)	91	16.3 (8.0)
Negative affect (PANAS)[b], mean (S.D.)	91	7.4 (7.8)
Depressive symptomology (IDS-SR), mean (S.D.)	104	17.9 (10.1)
Visual Analogue Mood Scale (VAMS), mean (S.D.)	84	38.3 (2.8)

Note. S.D.=Standard deviation, MDEs=Major Depressive Episodes, IQR=Interquartile range, Sever, PANAS=Positive and Negative Affect scale, IDS-SR=Inventory Depressive Symptomatology- Self Report, VAMS=Visual Analogue Mood Scale.

[a] Last MDE severity is based on the number of SCID-I depression symptoms, 5 symptoms correspond to mild, 6–7 symptoms correspond to moderate, 8–9 symptoms correspond to severe depression.

[b] PANAS at 4 weeks.

4. Results

In total, 107 participants were randomized to the control group. Of these participants three dropped out directly after inclusion. From the remaining 104 participants, 20 did not fill in the VAMS and 13 participants did not fill in the PANAS. In total, we have complete data for 70 (65.4%) participants. An overview of the demographic and clinical characteristics of the participants is presented in Table 1.

With regard to our first research question, the linear regression analysis of univariate baseline variables on depressive symptomatology showed that positive affect, negative affect and sad mood all individually predicted depressive symptomatology after six months. Positive affect and negative affect predicted depressive symptomatology better combined than separately. Sad mood combined with positive and negative affect predicted depressive symptomatology better than sad mood alone (R^2=.247). The results are presented in Table 2. The completers group differed from the imputated data on step 2b (positive affect, p=.025) and on step 3 (sad mood, p=.046).

With regard to our second research question, after controlling for baseline depressive symptomatology, positive affect remained a significant predictor for depressive symptomatology (p=.031). However, negative affect and sad mood were no longer a significant predictor for depressive symptomatology (p=.078/p=.388). The final model which combined all the above whilst controlling for baseline depressive showed that positive affect significantly contributed to the prediction of depressive symptomatology. Negative affect and sad mood, however, did not significantly contribute. The explained variance of this model was good (R^2=.305). An overview of these results is presented in Table 3.

With regard to our third research question, the 20 items of the PANAS were used to predict depressive symptomatology. The first model which contained only positive affect items showed that the item “Strong,” best predicted depressive symptomatology at six months. The second model which contained only negative affect items showed that the items, “Distressed,” “Hostile,” and “Jittery” best predicted depressive symptomatology. When combining the positive and negative affect items in the third model, the items that best predicted depressive symptomatology remained the same. This third model resulted in a significant improvement of the explained variance over the first two

Table 2
Multiple regression analyses of positive affect, negative affect, and sad mood on depressive symptomatology after six months (N =107).

	Depressive Symptomatology 6 months				
	B	**S.E.**	**t**	**p**	**R^2**
Step 1a					
Positive affect	−.413	.152	−2.709	.007	
					.103
Step 1b					
Negative affect[a]	2.549	.832	3.064	.002	
					.119
Step 1c					
Sad Mood	.161	.059	2.725	.007	
					.124
Step 2a					
Positive affect	−.394	.144	−2.740	.006	
Negative affect[a]	2.445	.812	3.012	.003	
					.213
Step 2b					
Sad Mood	.125	.061	2.032	.043	
Positive affect	−.291	.152	−1.913	.056	
					.170
Step 2c					
Sad Mood	.129	.059	2.178	.030	
Negative affect	2.005	.859	2.335	.020	
					.194
Step 3					
Sad Mood	.089	.061	1.441	.151	
Positive affect	−.310	.147	−2.102	.036	
Negative affect[a]	2.094	.846	2.476	.014	
					.247

Note. Sad Mood=measured by the VAMS, Positive affect=measured by the PANAS, Negative affect=measured by the PANAS.
[a] This variable was square root transformed to improve normality.

models. The fourth model included sad mood as an item but the items that best predicted depressive symptomatology still remained the same. An overview of the models and the results are presented in Table 4.

With regard to our fourth research question, there was no relationship between positive affect, negative affect and number of previous MDEs (R^2= < .001, p=.921/R^2=−.028, p=.098). There was also no relationship between sad mood and previous MDEs (R^2= < .001, p=.860).

5. Discussion

The main purpose of this study was to examine the role of positive affect, negative affect and sad mood in predicting return of depressive symptomatology. We also wanted to explore the relationship between positive affect, negative affect, sad mood, and number of previous MDEs. We found that positive affect, negative affect, and sad mood all individually predicted depressive symptomatology after six months. However, when we controlled for baseline depressive symptomatology, only the level of positive affect significantly contributed to the prediction of depressive symptomatology over 6 months. Finally, we found no relationship between the number of previous MDEs and affect.

Positive affect, negative affect, and sad mood as assessed after remission of recurrent depression all individually predicted return of depressive symptomatology after six months. The explained variance ranged from 10% to 12%, with an even higher explained variance of 25% for the combined affect measures. Our findings are in line with a previous study reporting an explained variance of 10% in predicting

Table 3
Multiple regression analyses of positive affect, negative affect and sad mood on depressive symptomatology after six months, while controlling for baseline symptomatology (N=107).

	Depressive Symptomatology 6 months				
	B	**S.E.**	**t**	**p**	**R^2**
Step 1					
Depressive sympt.[a]	3.991	.936	4.263	.000	
					.201
Step 2a					
Depressive sympt.[a]	3.564	.918	3.881	.000	
Positive affect	−.306	.141	−2.166	.031	
					.257
Step 2b					
Depressive sympt.[a]	3.312	.994	3.332	.001	
Negative affect[a]	1.499	.848	1.769	.078	
					.238
Step 2c					
Depressive sympt.[a]	3.332	1.144	2.914	.004	
Sad Mood	.062	.072	.864	.388	
					.220
Step 3					
Depressive sympt.[a]	2.686	1.117	2.404	.017	
Positive affect	−.303	.143	−2.115	.035	
Negative affect[a]	1.533	.840	1.825	.067	
Sad Mood	.018	.071	.256	.799	
					.305

Note. Depressive sympt.=Depressive symptomatology at baseline, Sad Mood=measured by the VAMS, Positive affect=measured by the PANAS, Negative affect=measured by the PANAS.
[a] This variable was square root transformed to improve normality.

Table 4
Multiple regression analyses of several models on depressive symptomatology after six months (N=70).

	Depressive Symptomatology 6 months						
					model summary		
	Beta	**S.E.**	**t**	**p**	**R^2**	**F**	**p**
Model 1							
5 Strong	−.472	.942	−4.415	< .001			
					.223	19.492	< .001
Model 2							
2 Distressed	−.299	1.416	−2.428	.018			
8 Hostile	.375	1.417	3.145	.002			
18 Jittery	.471	.986	4.156	.000			
					.343	11.504	< .001
Model 3							
2 Distressed	−.319	1.279	−2.869	.006			
5 Strong	−.375	.822	−4.020	< .001			
8 Hostile	.367	1.278	3.411	.001			
18 Jittery	.386	.908	3.698	< .001			
					.474	14.650	< .001
Model 4							
2 Distressed	−.319	1.279	−2.869	.006			
5 Strong	−.375	.822	−4.020	< .001			
8 Hostile	.367	1.278	3.411	.001			
18 Jittery	.386	.908	3.698	< .001			
					.474	14.650	< .001

Note. Model 1: All Positive affect items, Model 2: All Negative affect items, Model 3: All Positive and Negative affect items combined, Model 4: All Positive and Negative affect items, and VAMS combined, Sad Mood=measured by the VAMS, Positive affect=measured by the PANAS, Negative affect=measured by the PANAS.

return of depressive symptomatology and 6% in predicting relapse (van Rijsbergen et al., 2012, 2015). Our results show the importance of affect as predictive factor for relapse and the importance of differentiating between positive and negative affect in predicting depressive symptomatology. Positive affect had an independent contribution apart from baseline depressive symptomatology, to the prediction of return of depressive symptomatology, indicating the value of positive affect as risk factor for relapse.

Targeting positive affect in relapse prevention interventions might improve protective effects of these interventions, some relapse prevention interventions indeed aim at directly targeting increase of positive affect such as PCT. PCT is an eight-session intervention often delivered in groups and is based on acute phase cognitive therapy. Instead of focusing on current negative and dysfunctional thoughts, PCT aims at directly challenging negative beliefs/assumptions/schemas by identifying a fantasy belief (i.e. 'I am fantastic'). Subsequently, imagery techniques concerning this fantasy belief are used in order to strengthen and savor positive affect. Furthermore, patients are asked to keep a diary of positive experiences to enhance storage and retrieval of these positive experiences. Finally, a relapse-prevention plan consisting critical warning signs and potential helpful strategies is composed (Bockting et al., 2015). Other techniques which may be useful in targeting positive affect are virtual reality and mood induction with facial expressions (Felnhofer et al., 2015; Wild et al., 2001).

Negative affect and sad mood did not predict depressive symptomatology after six months when we controlled for baseline depressive symptomatology, this is in line with a previous study (van Rijsbergen et al., 2015). In an earlier study by van Rijsbergen et al. (2014) the VAMS was compared to the IDS-SR as a screen for depression and it showed excellent diagnostic accuracy. Also the predictive value of current relapse status of the one item scale assessing sad mood (VAMS) was better than the full IDS-SR (explained variance of respectively of 60% and 34%), indicating the potential of using a 1 item scale to monitor relapse of depression.

We found that especially four specific affects explained the predictive value of return of depressive symptomatology, i.e. higher levels of feeling hostile, and jittery and lower levels of feeling strong and distressed (explained variance of 47%). These items possibly reflect specific parts of affect associated with the increase or decrease of depressive symptomatology. Hostility has been linked to greater illness severity and lower treatment response in depression (Fava et al., 2010; Fisher et al., 2015). However, this is the first study that we know of to link hostility to increased depressive symptomatology in remitted patients. Future research is needed to replicate these findings and also possibly link specific affects directly to relapse and recurrence of MDD.

Contrary to our expectations, we found no association between number of previous episodes and positive affect, negative affect, and sad mood. This might indicate that depressive episodes do not result in emotional scars. Alternatively, emotional scarring as a consequence of undergoing a depressive episode might have developed after the first or second episode. Since we exclusively studied participants with recurrent depression, we cannot rule out potential scarring after the first episode. This finding was not in line with a previous study that indicated that patients who experienced more MDEs had higher levels of sad mood (van Rijsbergen et al., 2015). Although it is difficult to explain these contrasting findings satisfactory, they may have been caused by differences in study samples. Generally, the samples used in both studies were alike but in our study all participants received CBT before entering the study and fewer participants used antidepressant medication (31.8% compared to 62.9% in van Rijsbergen et al.). Another difference is that we administered the VAMS at baseline whereas in the study by van Rijsbergen et al. the administration of the VAMS ranged from baseline up to 24 months after inclusion. Possible, due to this longer interval, the assessment of the VAMS was closer to a next relapse, which is more likely to occur in patients with more previous MDEs. Consequently, van Rijsbergen et al. may have found more sad mood as a precursor of a next episode instead of scarring due to previous episodes. This study is one of the first to differentiate between positive affect and negative affect in predicting depressive symptomatology up to six months. Due to our relatively small sample size and the fact that the instruments for affect and mood were administered within four weeks of each other, we have to interpret our findings with caution. All of the participants in this study received CBT during the acute phase of their depression. Therefore, our results might not be generalizable to all remitted recurrently depressed patients. Due to the cross-sectional study design and the inclusion criteria of having two or more previous episodes, we were not able to distinguish between scarring and premorbid vulnerability. However, in spite of these limitations we found positive affect and negative affect as assessed after remission in recurrent depression to be strong predictors of return of depressive symptomatology. Especially positive affect seems to play an independent role in return of depressive symptomatology. This is in line with the growing amount of research linking affect to relapse and recurrence of depression (van Rijsbergen et al., 2015; Wichers et al., 2010). Directly targeting positive affect in relapse prevention, as is done in PCT described above, might be good target aims. Specifying different items of affect could help to further improve our understanding of recurrence and consequently offer ways to monitor patients who are at risk for recurrence. Therefore, we encourage replication of this study and hope to inspire future researchers to distinguish between positive affect and negative affect when studying relapse and recurrence.

References

Ames, M.E., Rawana, J.S., Gentile, P., Morgan, A.S., 2015. The protective role of optimism and self-esteem on depressive symptom pathways among Canadian Aboriginal youth. J. Youth Adolesc. 44 (1), 142–154.

Bockting, C.L., Hollon, S.D., Jarrett, R.B., Kuyken, W., Dobson, K., 2015. A lifetime approach to major depressive disorder: the contributions of psychological interventions in preventing relapse and recurrence. Clin. Psychol. Rev..

Burcusa, S.L., Iacono, W.G., 2007. Risk for recurrence in depression. Clin. Psychol. Rev. 27 (8), 959–985.

Charles, S.T., Piazza, J.R., Mogle, J., Sliwinski, M.J., Almeida, D.M., 2013. The wear and tear of daily stressors on mental health. Psychol. Sci. 24 (5), 733–741.

Dekker, J.J., Koelen, J.A., Van, H.L., Schoevers, R.A., Peen, J., Hendriksen, M., Kool, S., van Aalst, G., De Jonghe, F., 2008. Speed of action: the relative efficacy of short psychodynamic supportive psychotherapy and pharmacotherapy in the first 8 weeks of a treatment algorithm for depression. J. Affect. Disord. 109 (1–2), 183–188.

Engelen, U., De Peuter, S., Victoir, A., Van Diest, I., Van den Bergh, O., 2006. Further validation of the positive and negative affect schedule (PANAS) and comparison of two Dutch versions. Gedrag Gezondh. 34, 89–102.

Fava, G.A., Ruini, C., Rafanelli, C., Finos, L., Conti, S., Grandi, S., 2004. Six-year outcome of cognitive behavior therapy for prevention of recurrent depression. Am. J. Psychiatry 161 (10), 1872–1876.

Fava, M., Hwang, I., Rush, A.J., Sampson, N., Walters, E.E., Kessler, R.C., 2010. The importance of irritability as a symptom of major depressive disorder: results from the National Comorbidity survey replication. Mol. Psychiatry 15 (8), 856–867.

Felnhofer, A., Kothgassner, O.D., Schmidt, M., Heinzle, A., Beutl, L., Hlavacs, H., Kryspin-Exner, I., 2015. Is virtual reality emotionally arousing? Investigating five emotion inducing virtual park scenarios. Int. J. Hum.-Comput. Stud. 82, 48–56.

Fisher, L.B., Fava, M., Doros, G.D., Alpert, J.E., Henry, M., Huz, I., Freeman, M.P., 2015. The role of anger/hostility in treatment-resistant depression: a secondary analysis from the adapt – a study. J. Nerv. Ment. Dis. 203 (10), 762–768.

Frijda, N.H., 1994. Varieties of affect: emotions and episodes, moods, and sentiments. In: The Nature of Emotion: Fundamental Questions. Oxford University Press, New York, pp. 59–67.

Geschwind, N., Nicolson, N.A., Peeters, F., van Os, J., Barge-Schaapveld, D., Wichers, M., 2011. Early improvement in positive rather than negative emotion predicts remission from depression after pharmacotherapy. Eur. Neuropsychopharmacol. 21 (3), 241–247.

Gross, J.J., 2010. The future's So Bright, I Gotta wear shades. Emot. Rev. 2 (3), 212–216.

Hardeveld, F., Spijker, J., de Graaf, R., Nolen, W.A., Beekman, A.T., 2013. Recurrence of major depressive disorder and its predictors in the general population: results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). Psychol. Med. 43 (1), 39–48.

Hohn, P., Menne-Lothmann, C., Peeters, F., Nicolson, N.A., Jacobs, N., Derom, C., Thiery, E., van Os, J., Wichers, M., 2013. Moment-to-moment transfer of positive emotions in daily life predicts future course of depression in both general population and patient samples. PLoS One 8 (9), e75655.

de Jonge, M., Bockting, C.L., Kikkert, M.J., Bosmans, J.E., Dekker, J.J., 2015. Preventive Cognitive Therapy versus Treatment as Usual in preventing recurrence of depression: protocol of a multi-centered randomized controlled trial. BMC

Psychiatry 15, 139.
Judd, L.L., Akiskal, H.S., Maser, J.D., Zeller, P.J., Endicott, J., Coryell, W., Paulus, M.P., Kunovac, J.L., Leon, A.C., Mueller, T.I., Rice, J.A., Keller, M.B., 1998. Major depressive disorder: a prospective study of residual subthreshold depressive symptoms as predictor of rapid relapse. J. Affect. Disord. 50 (2–3), 97–108.
Kessler, R.C., Chiu, W.T., Demler, O., Merikangas, K.R., Walters, E.E., 2005. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. Arch. Gen. Psychiatry 62 (6), 617–627.
O'Hara, R.E., Armeli, S., Boynton, M.H., Tennen, H., 2014. Emotional stress-reactivity and positive affect among college students: the role of depression history. Emotion 14 (1), 193–202.
Peen, J., Dekker, J., Schoevers, R.A., Have, M.T., de Graaf, R., Beekman, A.T., 2007. Is the prevalence of psychiatric disorders associated with urbanization? Soc. Psychiatry Psychiatr. Epidemiol. 42 (12), 984–989.
Rubin, B.D., 1987. Multiple Imputation for Nonresponse in Surveys. John Wiley & Sons, New York.
Rush, A.J., Gullion, C.M., Basco, M.R., Jarrett, R.B., Trivedi, M.H., 1996. The Inventory of depressive symptomatology (IDS): psychometric properties. Psychol. Med. 26 (3), 477–486.
Siemer, M., 2005. Mood-congruent cognitions constitute mood experience. Emotion 5 (3), 296–308.
Solomon, D.A., Keller, M.B., Leon, A.C., Mueller, T.I., Lavori, P.W., Shea, M.T., Coryell, W., Warshaw, M., Turvey, C., Maser, J.D., Endicott, J., 2000. Multiple recurrences of major depressive disorder. Am. J. Psychiatry 157 (2), 229–233.
Spitzer, R.L., Williams, J.B., Gibbon, M., First, M.B., 1992. The structured clinical Interview for DSM-III-R (SCID). I: history, rationale, and description. Arch. Gen. Psychiatry 49 (8), 624–629.
SPSS Statistics for Windows, 2008. [17. 0]. Chicago, SPSS Inc.
van Rijsbergen, G.D., Bockting, C.L., Berking, M., Koeter, M.W., Schene, A.H., 2012. Can a one-item mood scale do the trick? Predicting relapse over 5.5-years in recurrent depression. PLoS One 7 (10), e46796.
van Rijsbergen, G.D., Hollon, S.D., Elgersma, H.J., Kok, G.D., Dekker, J., Schene, A.H., Bockting, C.L., 2015. Understanding emotion and emotional scarring in recurrent depression. Compr. Psychiatry 59, 54–61.
van Rijsbergen, G.D., Burger, H., Hollon, S.D., Elgersma, H.J., Kok, G.D., Dekker, J., de Jong, P.J., Bockting, C.L., 2014. How do you feel? Detection of recurrent major depressive disorder using a single-item screening tool. Psychiatry Res. 220 (1–2), 287–293.
Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. J. Pers. Soc. Psychol. 54 (6), 1063–1070.
Werner-Seidler, A., Banks, R., Dunn, B.D., Moulds, M.L., 2013. An investigation of the relationship between positive affect regulation and depression. Behav. Res. Ther. 51 (1), 46–56.
Whiteford, H.A., Degenhardt, L., Rehm, J., Baxter, A.J., Ferrari, A.J., Erskine, H.E., Charlson, F.J., Norman, R.E., Flaxman, A.D., Johns, N., Burstein, R., Murray, C.J., Vos, T., 2013. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease study 2010. Lancet 382 (9904), 1575–1586.
Wichers, M., Peeters, F., Geschwind, N., Jacobs, N., Simons, C.J., Derom, C., Thiery, E., Delespaul, P.H., van, O.J., 2010. Unveiling patterns of affective responses in daily life may improve outcome prediction in depression: a momentary assessment study. J. Affect. Disord. 124 (1–2), 191–195.
Wild, B., Erb, M., Bartels, M., 2001. Are emotions contagious? Evoked emotions while viewing emotionally expressive faces: quality, quantity, time course and gender differences. Psychiatry Res. 102 (2), (109-24.35).
World Medical Association, 2013. WMA Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects.