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Research report

Early maladaptive schemas in depressed patients: Stability and relation with depressive symptoms over the course of treatment

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ABSTRACT

Background: Early maladaptive schemas (EMSs) are hypothesized to be stable, trait-like, enduring beliefs underlying chronic and recurrent psychological disorders. We studied the relation of EMSs with depressive symptom severity and tested the stability of EMSs over a course of evidence-based outpatient treatment for depression in a naturalistic treatment setting.
Methods: The sample consisted of depressed outpatients ($N = 132$) treated at a specialized mood disorders treatment unit in The Netherlands. Participants completed measures of depressive symptom severity and maladaptive schemas before treatment and 16-weeks after starting with treatment.
Results: Specific maladaptive schemas (failure, emotional deprivation, abandonment/instability) were cross-sectionally related to depressive symptom severity. Moreover, the schema domain impaired autonomy & performance at pre-treatment related positively to depression levels at the 16-week follow-up assessment, whereas the schema domain overvigilance & inhibition at pre-treatment related negatively to depression levels at the follow-up assessment when controlling for pre-treatment depression severity. Finally, all EMSs demonstrated good relative stability over the course of treatment.
Conclusions: Our results suggest that specific EMSs are related to depressive symptom severity in clinically depressed patients, that specific schema domains predict treatment outcome, and that schemas are robust to change over time, even after evidence-based outpatient treatment for depression.

1. Introduction

According to the cognitive theory of depression (Beck, 1964) negative beliefs about the self, the world, and the future incorporated in stable cognitive schemas are the key vulnerability factor to depression. In most accounts of cognitive theory, dysfunctional cognitions can best be understood in terms of a hierarchical model of generality with automatic thoughts at the most superficial level, dysfunctional attitudes at an intermediate level, and cognitive schemas at the deepest level (Clark and Beck, 1999; Segal, 1988). While depressogenic cognition has usually been assessed at the level of automatic thoughts or dysfunctional attitudes (Segal and Swallow, 1994), studies assessing dysfunctional cognition at the schema level in depressed patients are sparse. One reason for this might be that schemas are usually considered as implicit cognitive structures that are not readily accessible (Segal, 1988).

Young recently revised the schema concept, emphasizing early maladaptive schemas (EMSs) as key structures in the development of psychopathology (Young, 1995). EMSs are defined as stable, trait-like, enduring beliefs about oneself and the world that are rooted in early childhood experiences (Young et al., 2003). EMSs are in many ways comparable to the cognitive theory concept of core beliefs, defined as the cognitive content of schemas (Clark and Beck, 1999) though there

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are also important differences between these two concepts (James et al., 2004). For example, core beliefs in depression were usually divided into three broad categories (helplessness, inadequacy, and unloveability), whereas EMSs are more specific. To date, 18 specific EMSs were identified and divided into five broader domains (see Table 1).

Although the concept of EMSs provides a valuable extension to the cognitive theory of depression concepts of automatic thoughts and dysfunctional attitudes, studies relating EMSs to depressive symptoms in depressed patients are relatively sparse. In non-clinically depressed samples it has been shown that the EMSs failure, defectiveness/shame, and self-sacrifice were associated with depressive symptom severity (Calvete et al., 2005). Another study found that the EMSs defectiveness/shame, insufficient self-control, vulnerability, and incompetence/inferiority were cross-sectionally related to depressive symptom severity in undergraduate students (Harris and Curtin, 2002). In a mixed clinical sample with mainly depressed patients it was found that the total score on the Schema Questionnaire (SQ; Young and Brown, 1994) was related to depressive symptom severity, even after controlling for neuroticism and other personality dimensions, suggesting that EMSs explain variance in depressive symptom severity beyond other trait-like constructs that are known to be related to depressive symptoms, like neuroticism (Thimm, 2010). In another clinical sample with mainly depressive symptoms it has been shown that the EMSs abandonment/instability, defectiveness/shame, failure, subjugation, and vulnerability to harm were cross-sectionally related to depression severity (Petrocelli et al., 2001). In depressed patients the schema domains undesirability, impaired autonomy & performance, and impaired limits were cross-sectionally related to depression severity (Halvorsen et al., 2009). Finally, another study found that in depressed outpatients the EMSs defectiveness/shame, self-sacrifice, and insufficient self-control were related to depressive symptom severity (Shah and Waller, 2000).

Taken together, studies relating schema domains and specific EMSs to depressive symptom severity found that a wide range of EMSs are related to depressive symptom severity, especially those belonging to the impaired autonomy & performance and to the disconnection & rejection domains. While previous research has exclusively focused on the concurrent relation between EMSs and depressive symptoms, the relation of EMSs with symptom improvement during treatment for depression remains unclear.

When studying the relation between EMSs and depressive symptoms in depressed patients, it is important to also determine whether EMSs remain stable in the context of change in depressive symptoms (i.e., during treatment). A fundamental assumption in schema–theory is that EMSs are stable, trait-like constructs that are resistant to change (Young et al., 2003). Accordingly, one would not expect EMSs to change over the course of short-term outpatient treatment that is focused on reducing depressive symptomatology instead of decreasing EMSs. Riso et al. (2006) examined the long-term stability of EMSs in 55 depressed outpatients over a course of 2.5 to 5 years and found that EMSs exhibited good stability, comparable with that of personality disorder features (Riso et al., 2006). Similarly, Wang et al. (2010) found moderate stability for most EMSs in depressed patients after a 9 year follow-up. While these studies suggest that EMSs exhibit good long term stability in depressed patients, the stability of EMSs over a course of outpatient treatment for depression remains unclear. To the best of the authors' knowledge, the present study is the first to investigate the stability of EMSs in depressed patients over a course of outpatient treatment for depression.

Table 1
A brief description of the five schema domains and all 18 early maladaptive schemas (EMSs).

Schema domains and early maladaptive schemas	Description
Disconnection & rejection	Schemas that involve expectations that one's needs for security and stability will not be met in a predictable manner.
Abandonment/instability	The perceived instability or unreliability of those available for support.
Mistrust/abuse	The expectation that others will intentionally hurt, abuse, humiliate, cheat, lie, manipulate or take advantage.
Emotional deprivation	The expectation that one's desire for emotional support, nurturance, empathy or protection by others will not be met.
Defectiveness/shame	The feeling that one is defective, bad, unwanted, inferior, or invalid.
Social isolation	The feeling that one is isolated from the world, different from others and not part of a community.
Impaired autonomy & performance	Schemas that involve expectations about oneself and the environment that interfere with one's perceived ability to function independently and to perform successfully.
Dependence/incompetence	The belief that one is not able to handle everyday responsibilities without help from others.
Vulnerability to harm or illness	Exaggerated fear that an unpreventable medical, emotional or external catastrophe will strike.
Enmeshment	Excessive emotional involvement with significant others at the expense of individualization.
Failure	The belief that one has failed or will fail in areas of achievement.
Impaired limits	Schemas involving a deficiency in internal limits and responsibility to others.
Entitlement	The belief that one is superior to others and entitled to special rights and privileges.
Insufficient self-control	A pervasive difficulty or refusal to exercise sufficient self-control and frustration tolerance to achieve personal goals.
Other-directedness	Schemas that involve an excessive focus of the desires and feelings of others.
Subjugation	Surrendering of control to others to avoid negative consequences.
Self-sacrifice	The excessive focus of meeting needs of others at the expense of one's own gratification.
Approval-seeking	An excessive focus on gaining approval, recognition, or attention from others.
Overvigilance & inhibition	Schemas that involve an overemphasis on suppressing one's spontaneous impulses and feelings.
Negativity	A lifelong focus on the negative aspects of life while minimizing the positive aspects.
Emotional inhibition	Inhibiting spontaneous action, feelings, or communication to avoid disapproval by others or feelings of shame.
Unrelenting standards	The belief that one must strive to meet very high standards to avoid criticism.
Punitiveness	The belief that people should be harshly punished for mistakes.

Previous work on the stability of EMSs has emphasized the importance of considering both absolute stability and relative stability when studying change in EMSs over time (Riso et al., 2006). Absolute stability refers to the stability in the mean level of the construct under study over time, whereas relative stability refers to the degree to which relative differences between individuals remain over time (Santor et al., 1997). It has been shown that, in the context of acute change in depressive symptoms (i.e., during depression treatment), dysfunctional cognitions can show large changes in mean level stability in the presence of strong relative stability (Beevers and Miller, 2004; Zuroff et al., 1999). Such findings suggest that measures of dysfunctional cognitions in depressed individuals tap both mood dependent, state-like properties, as evident in changes in mean level stability, as well as mood independent, trait-like properties, as evident in strong relative stability (Beevers and Miller, 2004; Zuroff et al., 1999). Given that EMSs are likely related to depression severity and given that depression severity scores are likely to decrease during treatment. both absolute and relative stability should be considered when studying the stability of EMSs in the context of symptom change.

In the present study, we sought to further examine the relation between EMSs and depressive symptoms and the stability of EMSs over a course of outpatient treatment for depression in patients diagnosed with Major Depressive Disorder (MDD). We hypothesized that (1) EMSs from the disconnection & rejection and from the impaired autonomy & performance domains are cross-sectionally related to depressive symptom severity; (2) high initial levels of EMSs domains are negatively related to the improvement of depressive symptoms over the course of treatment; (3) EMSs remain relatively stable over a course of outpatient treatment for depression.

2. Method

2.1. Participants

The present report is based on a sample of 132 depressed outpatients treated at the mood disorder treatment program of the Academic Community Mental Health Center Maastricht (RIAGG Maastricht, The Netherlands). In this secondary care facility, depressed individuals are preferably treated with cognitive therapy (CT), interpersonal therapy (IPT), antidepressant medication (ADM), or a combination of psychotherapy and medication. The inclusion criteria for participation in the present study was a Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) diagnosis of MDD as assessed by the Structured Clinical Interview for DSM-IV (SCID-I; First et al., 1996). Participants were excluded if they had a primary diagnosis other than MDD, high acute suicide risk, or insufficient Dutch language skills. The mean age of the sample was 40.7 years ($SD = 12.06$); 58% were female; 33.3% were married, 25% were single, 17.4% cohabited with their partner, 17.4% were divorced, 3.8% were widowed, and 3.1% had a spouse but did not live together. At pre-treatment, the sample was characterized by moderate to severe levels of depressive symptom severity according to the Beck Depression Inventory second edition (BDI-II; Beck et al., 1996), $M = 29.42$, $SD = 10.33$. The mean number of previous depressive episodes was 1.82 ($SD = 3.17$). Of the overall sample, 42.2% also had a comorbid Axis-I diagnosis in addition to a primary diagnosis of MDD. Comorbid anxiety disorders were the most common (31.8%) followed by substance-related disorders (10.6%), eating disorders (7.6%) and somatoform disorders (3%). There were no statistically significant differences between patients with comorbid Axis-I diagnosis and patients without comorbid Axis-I diagnosis with respect to BDI-II pre-treatment levels (time 1), $t(130) = -1.43$, $p = .16$, BDI-II levels at the 16-week follow-up assessment (time 2), $t(83) = -1.28$, $p = .21$, total SQ score at time 1, $t(130) = -1.76$, $p = .08$, or total SQ score at time 2, $t(83) = -0.64$, $p = .52$.

Of the overall sample of 132 patients that entered the study and completed questionnaires at time 1, 85 patients (64%) also completed the questionnaires at time 2. Patients who completed both assessments reported a higher mean age at pre-treatment ($M = 43.04$, $SD = 12.24$), compared to patients who did not provide a time 2 assessment ($M = 36.45$, $SD = 10.59$), $t(130) = 3.10$, $p = .002$. There were no statistical significant differences in gender distribution $\chi^2(1, N = 132) = 1.21$, $p = .27$. Moreover, the two samples did not differ statistically significantly with respect to pre-treatment depressive symptom severity, $t(130) = 0.19$, $p = .85$ or pre-treatment EMSs (all p values $> .003$).[1] Therefore, we considered the sub-sample of completers as representative for the overall sample with respect to symptom severity, EMSs, and gender distribution.

Of the overall sample, 51 patients (38.6%) received CT, 29 patients (22%) received a combination of CT and ADM, 21 patients (15.9%) received IPT, 12 patients (9.1%) received a combination of IPT and ADM, 12 patients (9.1%) received ADM, and seven patients (5.3%) received other treatments.

2.2. Measures

2.2.1. SCID-I

As part of the routine diagnostic procedure at the clinical site, Axis-I diagnosis was assessed at an initial diagnostic assessment using the SCID-I (First et al., 1996). The interview was administered by trained master or doctoral-level psychologists, psychotherapists, psychiatrists, and senior psychiatric residents.

2.2.2. BDI-II

Depression severity was assessed using the BDI-II (Beck et al., 1996), a 21-item self-report instrument assessing depressive symptoms during the last two weeks. Each item is represented by four statements in terms of increasing severity. For each statement a score of 0–4 is assigned resulting in a total score of 0 to 63. In the present study the Dutch version of the BDI-II was used, which was shown to possess high internal consistency in a Dutch sample of psychiatric patients (Cronbach's $\alpha = .92$) as well as adequate construct validity with related depression rating scales (*r*s between .79 and .85; van der Does, 2002). In the present study, internal reliability coefficient alpha for the BDI-II total score was excellent both at time 1 ($\alpha = .87$) and at time 2 ($\alpha = .94$).

[1] Bonferonni-corrected significance level α: .05/15.

2.3. Schema Questionnaire

The Schema Questionnaire (SQ) is a 205-item self-report instrument, designed to assess 16 specific EMSs (Young and Brown, 1994).[2] These 16 EMSs are (1) abandonment/instability, (2) defectiveness/shame, (3) emotional deprivation, (4) mistrust/abuse, (5) social isolation, (6) dependence/incompetence, (7) vulnerability to harm and illness, (8) enmeshment, (9) failure to achieve, (10) social undesirability, (11) entitlement/grandiosity, (12) insufficient self-control/selfdiscipline, (13) self-sacrifice, (14) subjugation, (15) emotional inhibition, and (16) unrelenting standards. See Table 1 for a brief description of each EMS. The EMS social undesirability is no longer considered a separate schema in schema theory and is therefore omitted from the present study. Thus, the present report is based on 15 EMSs covered by the 205-items version of the SQ. Each item is phrased as a negative core belief regarding oneself or ones relation to others. Items are rated along a 6 point scale ranging from 1 (*Completely untrue of me*) to 6 (*Describes me perfectly*). In the present study the Dutch version of the original 205-item version was used (Sterk and Rijkeboer, 1997). High internal reliability was reported in a Dutch sample of psychiatric patients for all SQ subscales (Cronbach's $\alpha = .74–.92$; Rijkeboer and van den Bergh, 2006). In the present study internal reliability coefficient alpha of the SQ was good to excellent for all subscales both at time 1 (median $\alpha = .88$; range .78–.92) and at time 2 (median $\alpha = .92$; range .78–.94).

2.4. Procedure

Patients who were referred to the treatment program underwent an intake procedure consisting of an open interview as part of the general intake procedure at the clinic and a SCID I interview (First et al., 1996). Moreover, patients received verbal and written information about evidence-based treatment options at the clinic. To formulate treatment recommendations, clinical history and diagnoses were discussed in an interdisciplinary team meeting. The final choice of treatment modality was taken in agreement between patient and therapist. In some cases (e.g., chronic depression) the therapist actively advised ADM in combination with psychotherapy. ADM treatment consisted of selective serotonin reuptake inhibitors (SSRIs) according to national and international guidelines (American Psychiatric Association, 2000; National Institute of Clinical Evidence, 2004) or in case of previous SSRI non-response venlafaxine or a tricyclic agent. CT and IPT consisted of weekly therapy sessions (50 min each) by experienced therapists, with the possibility of biweekly booster sessions in later stages. CT was provided according to the treatment manual by Beck et al. (1979) and IPT was provided according to the treatment manual by Klerman et al. (1984). All therapists received appropriate training and had weekly meetings to discuss ongoing cases and difficulties. Patients who were willing to participate in the study provided written informed consent. Time 1 measures were obtained before the patient started with treatment and time 2 measures were obtained 16-weeks after the initial assessment.

3. Statistical analyses

To test hypothesis 1, we first computed Pearson correlations between the total scores on the five schema domains and the BDI-II at time 1. We then conducted a stepwise multivariate regression analysis with a backward deletion procedure. In all multivariate regression analyses with backward deletion procedures, a predictor was removed from the model when the partial *F* value reached a significance level of $\alpha > .10$ and the model was rerun with the respective predictor omitted. In the first analysis, the five schema domains at time 1 were simultaneously entered as predictors and the BDI-II total score at time 1 was entered as dependent variable. We repeated this analysis entering four schema domains in the regression analysis because it has been suggested that four schema domains provide a better description of the underlying EMS (Hoffart et al., 2005). Following this analysis, a second multivariate regression analysis was conducted with specific EMSs at time 1 as predictors and BDI-II total scores at time 1 as dependent variable. Given the limited sample size in the current study and the relative large amount of predictors (15 EMSs) we decided to only enter those EMSs belonging to the schema domains that were significantly related to depressive symptom severity in the first regression analysis.

To test hypothesis 2, we conducted a hierarchical multivariate linear regression analysis with the BDI-II total score at time 2 as dependent variable. In the first step, the BDI-II total score at time 1 was entered in the model. In the second step, the mean scores on the 5 schema domains at time 1 were entered. Given the limited sample size for the time 2 assessments, we did not conduct a separate analysis for specific time 1 EMSs as predictors of the time 2 BDI-II total score.

To test hypothesis 3, we followed the analytic procedure emphasized by previous research on the stability of EMSs (e.g., Riso et al., 2006; Wang et al., 2010). First, Pearson correlations between EMSs at time 1 and EMSs at time 2 were calculated. Then, rank order stability was derived from standardized beta weights of multivariate regression models after controlling for depression severity at both time points. We used separate regression equations for each individual EMS with the time 2 EMS score as dependent variable, the time 1 EMS score as predictor and the BDI-II total score at both time points as covariates. High relative stability in these analyses is indicated by large test–retest correlations and large standardized beta coefficients (Santor et al., 1997). To determine the absolute stability of EMSs we conducted a series of paired-sample *t*-tests with a Bonferroni adjusted significance level alpha (.05/15) to control for multiple testing. We also computed effect sizes for all mean differences using Cohen's *d*. In these analyses, statistically significant mean differences in EMSs between the two time points are indicative for poor absolute stability. We also determined effects of the different treatment conditions on change in depressive symptom severity and change in EMSs by including dummy coded variables for the different treatment conditions in the regression

[2] Although to date 18 EMSs were identified, the 205-item version of the SQ that was used in the current study does only measure 16 EMSs. This is because the listing of EMSs has been updated more recently than the SQ that was used in this study. The EMSs that are not covered by the 205-item SQ are approval-seeking/recognition-seeking, negativity/pessimism, and punitiveness.

models of change described above. In these models the CT condition was used as the reference condition.

4. Results

First, we examined diagnostic statistics to test for assumptions of linear regression analyses. Although all schema domains displayed statistically significant and moderate to strong intercorrelations (*r*s between .51 and .75), the assumption of non-perfect collinearity was met (tolerance was >.2 and VIF <10) for all regression models; visual inspection of normality plots suggested that error terms were normally distributed; the assumption of independent errors was met (Durbin Watson test between 1.81 and 2.01); all standardized residuals were in the range of −3 and 3, suggesting that there were no outliers or influential cases.

4.1. Concurrent relations between depressive symptom severity, schema domains and specific EMSs — Hypothesis 1

Table 2 shows means, standard deviations, and Pearson correlations between BDI-II total scores at time 1 and the five schema domains at time 1. All schema domains correlated highly and statistically significantly with the BDI-II total score at time 1. The mean endorsement of the five schema domains at time 1 ranged from 2.49 to 3.14. To date there are no norm scores available for the SQ. The mean endorsement of schema domains in the present study is comparable to the mean endorsement of schema domains previously reported in depressed samples (e.g., Halvorsen et al., 2009).

Table 3 summarizes the results of the stepwise multivariate regression analysis. The BDI-II total score at time 1 was entered as dependent variable and the five schema domains at time 1 as independent variables. In the final model, the schema domains impaired autonomy & performance and disconnection & rejection remained as significant predictors of BDI-II total scores at time 1, $\beta = .34$, $t(129) = 3.48$, $p < .001$, and $\beta = .35$, $t(129) = 3.53$, $p < .001$, respectively. Together these two schema domains explained 41% of the variance in BDI-II total scores at time 1. We repeated the analysis with the four schema domains proposed by Hoffart et al. (2005) and again found that impaired autonomy & performance and disconnection & rejection remained as significant predictors of BDI-II total scores at time 1, $\beta = .40$, $t(129) = 3.86$, $p < .001$, and $\beta = .43$, $t(129) = 3.92$, $p < .001$, respectively.

To determine which specific EMSs from the impaired autonomy & performance and disconnection & rejection domains were related to depressive symptom severity, all EMSs from these two domains were included in another multivariate stepwise regression analysis. Table 4 summarizes the results of the initial model with all EMSs as predictors, the next to final model, and the final model. In the final model, three specific EMSs remained as significant predictors of depressive symptom severity: abandonment/instability, $\beta = .31$, $t(127) = 2.99$, $p = .003$, failure, $\beta = .41$, $t(127) = 5.11$, $p < .001$, and emotional deprivation, $\beta = .19$, $t(127) = 2.22$, $p = .028$. Moreover, the EMS enmeshment remained as a marginally significant predictor of depressive symptom severity, $\beta = -.14$, $t(127) = -1.83$, $p = .07$. The final model explained 48% of the variance in BDI-II total scores at time 1.

4.2. Relation between EMSs at time 1 and depressive symptom severity at time 2 — Hypothesis 2

Table 5 summarizes the results of the multivariate hierarchical regression model predicting reduction in depressive symptom severity with the five schema domains at time 1. The BDI-II total score at time 2 was entered as dependent variable. The BDI-II total score at time 1 was entered as predictor at step 1 and the five schema domains at time 1 were simultaneously entered as predictors at step 2. At step 1, time 1 depression severity was a significant predictor of time 2 depression severity, $\beta = .75$, $t(83) = 10.29$, $p < .001$, explaining 56% of the variance in the BDI-II total score at time 2. Adding the five schema domains at step 2 significantly improved the hierarchical regression model, $\Delta R^2 = .06$, $p = .035$. At step 2, time 1 scores on the overvigilance & inhibition domain were negatively related to the BDI-II total score at time 2, $\beta = -.29$, $t(78) = -2.20$, $p = .031$. Moreover, there was a marginally significant positive relation between the impaired autonomy & performance domain and time 2 depression severity, $\beta = .27$, $t(78) = 1.97$, $p = .053$.

4.3. Stability of EMSs over the course of treatment — Hypothesis 3

4.3.1. Absolute stability

The absolute stability of EMSs over the course of treatment was determined by paired sample *t*-tests. The results of this analysis are summarized in Table 6. After controlling for multiple testing, there was a statistically significant but small decrease in the total SQ score from time 1 to time 2, $t(84) = 4.50$, $p = .003$, $d = 0.29$. Moreover, patients statistically significantly improved on 10 EMSs (abandonment/instability, mistrust/abuse, emotional deprivation, dependence/incompetence,

Table 2
Means, standard deviations, and Pearson correlations between BDI-II scores and the five schema domains at time 1.

Measure	1	2	3	4	5	6	7
1. T1 BDI-II	29.42 (10.33)						
2. T1 Total schemas	.63	2.71 (0.73)					
3. T1 Disconnection & rejection	.60	.94	2.72 (0.93)				
4. T1 Impaired autonomy & performance	.59	.89	.73	2.49 (0.75)			
5. T1 Impaired limits	.41	.80	.71	.68	2.59 (0.73)		
6. T1 Other-directedness	.54	.83	.71	.73	.51	3.14 (0.84)	
7. T1 Overvigilance & inhibition	.50	.86	.75	.70	.70	.71	2.81 (0.84)

Note. Off-diagonal shows correlation coefficients; diagonal shows means and standard deviations; $N = 132$; T1 = time 1; BDI-II = Beck Depression Inventory-II. All correlation coefficients are significant ($p < .001$; two-tailed).

Table 3
Summary of multivariate linear regression analysis with backward deletion predicting time 1 depressive symptom severity with schema domains at time 1.

Predictor	Model 1		Model 2		Model 3		Model 4	
	B (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β
Constant	7.72 (3.09)*		7.75 (3.07)*		8.97 (2.71)**		7.12 (2.49)**	
T1 Overvigilance & inhibition	0.38 (1.46)	.03						
T1 Other directedness	1.01 (1.42)	.08	1.13 (1.34)	.09				
T1 Impaired limits	−2.34 (1.56)	−.16	−2.21 (1.48)	−.16	−2.42 (1.45)	−.17		
T1 Impaired autonomy & performance	4.88 (1.65)**	.35	4.91 (1.64)**	.36	5.56 (1.44)**	.40	4.74 (1.36)**	.34
T1 Disconnection & rejection	4.17 (1.38)**	.38	4.26 (1.33)**	.38	4.72 (1.21)**	.43	3.85 (1.09)**	.35
R^2	.43		.43		.42		.41	
ΔR^2	.43		.00		−.01		−.01	

Note. $N = 132$; T1 = time 1.
* $p < .05$.
** $p < .01$.

Table 4
Summary of multivariate linear regression analysis with backward deletion predicting time 1 depressive symptom severity with domain specific EMSs at time 1.

Predictor	Model 1		Model 5		Model 6	
	B (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β
Constant	7.91 (2.49)**		7.92 (2.47)**		8.06 (2.32)	
T1 Dependence/incompetence[a]	0.08 (1.28)	.01				
T1 Vulnerability to harm[a]	0.41 (1.18)	.03				
T1 Defectiveness/shame[b]	1.19 (1.48)	.11				
T1 Social inhibition[b]	−1.40 (1.11)	−.16				
T1 Mistrust/abuse[b]	0.95 (1.14)	.09	1.10 (1.08)	.11		
T1 Enmeshment[a]	−1.78 (0.95)	−.15	−1.66 (0.92)	−.14	−1.68 (0.92)	−.14
T1 Emotional deprivation[b]	1.50 (0.93)	.17	1.22 (0.84)	.14	1.63 (0.73)*	.19
T1 Abandonment/instability[a]	2.55 (1.29)	.26	2.60 (1.14)*	.26	3.09 (1.03)**	.31
T1 Failure[a]	3.95 (.98)**	.41	3.98 (0.77)**	.42	3.96 (0.77)**	.41
R^2	.49		.48		.48	
ΔR^2	.49		−.01		.00	

Note. $N = 132$; T1 = time 1.
[a] Schema domain impaired autonomy and performance.
[b] Schema domain disconnection and rejection.
* $p < .05$.
** $p < .01$.

vulnerability to harm, insufficient self-control, subjugation, self-sacrifice, emotional inhibition, unrelenting standards) with small to medium effect sizes (Cohen's *d* between 0.15 and 0.35; Cohen, 1988). To compare stability of EMSs to symptom level stability, we also computed change in BDI-II total scores and found a statistically significant decrease in BDI-II total scores from time 1 ($M = 29.55$, $SD = 10.63$) to time 2 ($M = 21.24$; $SD = 13.42$), $t(84) = 8.59$, $p < .001$, $d = 0.69$.

4.3.2. Relative stability

The relative stability of EMSs over the course of treatment was determined by correlational and regression analyses. Table 6 shows stability correlations between EMSs at both time points. Time 1 EMS subscales correlated highly and statistically significantly with time 2 EMSs subscales (bivariate stability coefficients *r* between .68 and .87, $p < .001$). After controlling for depression severity at both time points in re-

Table 5
Summary of multivariate hierarchical regression analyses testing whether schema domains at time 1 predict depressive symptom severity at time 2.

Step	Predictor	*B* (*SE*)	β	*t*	R^2	ΔR^2
Step 1	T1 BDI-II	0.95 (0.09)	.75	10.29**	.56	.56
Step2	T1 BDI-II	0.77 (0.12)	.61	6.34**	.62	.06
	T1 Impaired limits	−1.04 (2.11)	−.06	−.49		
	T1 Other directedness	.01 (2.02)	.00	.01		
	T1 Disconnection & rejection	3.61 (1.93)	.25	1.87		
	T1 Impaired autonomy & performance	4.72 (2.40)	.27	1.97		
	T1 Overvigilance & inhibition	−4.74 (2.15)*	−.29	−2.20		

Note. $N = 85$; T1 = time 1; BDI-II = Beck Depression Inventory-II.
* $p < .05$.
** $p < .01$.

Table 6
Relative and absolute stability of EMSs from time 1 to time 2.

Variable	Relative stability		Absolute stability				
			Time 1	Time 2			
	Stability[a]	Stability[b]	*M* (*SD*)	*M* (*SD*)	Paired *t* test	*df*	*d*
SQ total	.82**	.62**	2.62 (0.76)	2.39 (0.80)	4.50**	84	0.29
Abandonment/instability	.80**	.63**	2.76 (1.03)	2.46 (1.06)	4.12**	84	0.29
Mistrust/abuse	.85**	.75**	2.57 (1.02)	2.36 (1.05)	3.44*	84	0.20
Emotional deprivation	.87**	.82**	2.75 (1.21)	2.49 (1.24)	3.88**	84	0.21
Defectiveness/shame	.78**	.58**	2.22 (0.96)	2.07 (0.99)	2.05	84	0.15
Social isolation/alienation	.79**	.66**	2.85 (1.20)	2.60 (1.23)	2.85	84	0.21
Dependence/incompetence	.79**	.59**	2.51 (0.98)	2.29 (0.96)	3.15*	84	0.23
Vulnerability to harm	.81**	.70**	2.26 (0.86)	1.97 (0.79)	5.18**	84	0.35
Enmeshment	.74**	.68**	2.05 (0.89)	1.90 (0.96)	2.07	84	0.16
Failure	.77**	.63**	2.78 (1.09)	2.59 (1.22)	2.22	84	0.16
Entitlement/grandiosity	.68**	.62**	2.18 (0.69)	2.01 (0.68)	2.96	84	0.25
Insufficient self-control	.80**	.70**	2.74 (0.89)	2.47 (0.94)	4.22**	84	0.29
Subjugation	.80**	.71**	2.77 (1.04)	2.57 (1.02)	2.70*	84	0.19
Self-sacrifice	.79**	.65**	3.40 (0.90)	3.18 (1.00)	3.35*	84	0.23
Emotional inhibition	.81**	.72**	2.62 (1.05)	2.29 (1.02)	4.70**	84	0.32
Unrelenting standards	.79**	.77**	2.80 (0.90)	2.52 (0.94)	4.22**	84	0.30

Note. $N = 85$; SQ = Schema Questionnaire; effect sizes (*d*s) were calculated by dividing the mean difference with the pooled standard deviation and may be interpreted as small to medium (Cohen, 1988).
[a] Bivariate stability correlations.
[b] Stability coefficient after controlling for depression severity at both time points in regression analyses.
* $p < .05$ (corrected for multiple testing).
** $p < .01$ (corrected for multiple testing).

gression analyses, the stability coefficient (β) decreased slightly but remained statistically significant (βs between .58 and .82, $p < .001$) suggesting that EMSs exhibit high relative stability over the course of 16-week outpatient treatment for depression.

4.4. Differences in change of depressive symptoms and change in EMSs between treatment conditions

Adding the different treatment conditions to the regression model of change in depressive symptom severity did not significantly improve the model ($\Delta R^2 = .04$, $p = .59$). Moreover, there were no differences in change of the total SQ score between treatment conditions (all *p*-values > .05). With respect to specific EMSs, there was less change in the EMS self-sacrifice in the IPT condition compared to the CT condition, $\beta = .14$, $t(84) = 1.96$, $p = .05$ and there was less change in the EMS unrelenting standards in the other-treatments condition compared to the CT condition, $\beta = .13$, $t(84) = 2.03$, $p < .05$.

4.5. Differences in change in EMSs between treatment responders and treatment non-responders

We also determined the relative stability of EMSs between treatment responders (defined as a drop in BDI-II levels by more than 50%) and treatment non-responders. Non-responders reported greater change on the EMS social inhibition compared to responders, $\beta = -.17$, $t(84) = -2.27$, $p < .05$. Change scores on the other EMSs did not differ statistically significantly between responders and non-responders (all *p*-values > .05).

5. Discussion

The aims of this study were to relate EMSs to depressive symptom severity during a course of outpatient treatment for depression and to determine the relative and absolute stability of EMSs over the course of treatment. We found that, after controlling for overlap among schema domains, EMSs from the domains impaired autonomy & performance and disconnection & rejection were related to depressive symptom severity in a naturalistic sample of outpatients suffering from MDD. This finding is largely in line with previous findings relating EMSs to depressive symptom severity (e.g., Calvete et al., 2005; Harris and Curtin, 2002) and suggests that depressed patients are characterized by a specific set of EMSs. In particular, in cross-sectional analyses we found that the EMSs abandonment/instability, emotional deprivation, and failure were positively related to depressive symptom severity when controlling for overlap among EMSs. Moreover, the EMS enmeshment was marginally significantly negatively related to depressive symptom severity. These four EMSs accounted for 48% of the variance in depressive symptom severity with the failure schema accounting for the largest part. It should be noted, however, that there were weak to strong intercorrelations (*r*s between .27 and .64) among these four EMSs which makes it difficult to determine the individual importance of each predictors. These findings are consistent with the cognitive model of depression, placing schemas or core beliefs in the domains of failure, loss, and worthlessness at the core of depressive symptoms (Beck, 1964, 1987).

We also investigated the validity of schema domains at pre-treatment as predictors of improvement in depressive symptom severity over the course of treatment and found that the schema domain overvigilance & inhibition was

negatively related to depressive symptom severity whereas the schema domain impaired autonomy & performance was positively related to depressive symptom severity assessed 16-weeks after the start of treatment. The relation between impaired autonomy & performance and depressive symptom severity at time 2 was slightly below the threshold of statistical significance and should therefore be interpreted with caution. The finding that EMSs from the overvigilance & inhibition domains at pre-treatment were negatively related to depressive symptom severity at the time 2 assessment was unexpected and is difficult to explain in the context of schema theory. Patients with high scores on this EMS domain are typically characterized by a suppression of spontaneous feelings and impulses or by a preoccupation of meeting high internalized standards of performance (Young et al., 2003). One possible, explanation of this finding is that patients who score high on this schema domain might tend to deny or inhibit their negative emotions in self-report of depressive symptoms. Hence, they might report less depressive symptoms at time 2 because of a high inhibition of emotions. An alternative explanation, suggested by one of the anonymous reviewers, is that patients with high scores on this schema domain work harder in therapy because of their high internalized standards of performance and therefore obtain better results. Both explanations are speculative and require further testing. The finding that impaired autonomy & performance levels at pre-treatment were positively related to depressive symptoms at time 2 suggest that depressed patients with increased expectations about themselves and others that interfere with their perceived ability to function independently or perform successfully show less symptom improvement in treatment for depression. However, given the relatively low percentage of explained variance in BDI-II scores, the robustness of these findings is questionable and replication in more controlled studies is needed. Moreover, it should be noted that studies on the psychometric properties of the SQ have yielded mixed results regarding the higher-order factor structure (Hoffart et al., 2005; Lee et al., 1999; Schmidt et al., 1995; Soygüt et al., 2009). Therefore, our findings regarding the predictive validity of schema domains should be interpreted with caution.

Consistent with our third hypothesis, we found high relative stability of EMSs from time 1 to time 2 in the context of statistically significant and large decreases in depressive symptom severity. Moreover, the relative stability of EMSs remained high when controlling for depressive symptom severity at both time points. Given that none of the treatment protocols in the present study explicitly targets EMSs this finding was expected. In terms of absolute stability, we found a statistically significant but small (Cohen's *d* between 0.15 and 0.35) decrease in 10 EMSs (abandonment/instability, mistrust/abuse, emotional deprivation, dependence/incompetence, vulnerability to harm, insufficient self-control, subjugation, self-sacrifice, emotional inhibition, unrelenting standards) whereas decrease in depressive symptom severity was statistically significant and moderate (Cohen's $d = 0.69$). Given the high relative stability and the low effect sizes for the mean differences, our findings suggest that EMSs remain stable in depressed patients over a course of outpatient treatment. This finding is consistent with earlier research on the stability of EMSs in depressed patients (Riso et al., 2006; Wang et al., 2010) and the notion that EMSs represent stable, trait-like constructs (Young et al., 2003). Moreover, our results extend previous findings on the stability of EMSs in depression that have primarily focused on the long-term stability of EMSs (Riso et al., 2006; Wang et al., 2010) to the relative stability of EMSs in the context of symptom change.

We also determined the stability of EMSs in the different treatment conditions and found no substantial differences between treatment conditions, except for the EMS self-sacrifice which changed less in the IPT condition compared to the CT condition and for the EMS unrelenting standards which changed less in the other-treatments condition, compared to the CT condition. However, given the lack of random assignment to treatment conditions in the current study, these results should be interpreted with caution. Overall, our results indicate that there are no substantial differences in change in EMSs across treatment conditions. There is a need to replicate these findings in more controlled settings.

5.1. Limitations

First, we did not include a clinical control group with psychopathology other than depression in this study and therefore no conclusions regarding the specificity of our findings can be drawn. Second, we did not assess Axis-II psychopathology. Given that patients with Axis-II psychopathology generally exhibit high scores of EMSs (Nordahl et al., 2005), it is desirable to assess and control for Axis-II comorbidity when studying the relation between EMSs and depressive symptoms. Third, we determined cross-sectional relations between EMSs and depressive symptoms. While theory would suggest that EMSs drive depression, the nature of our research design and analyses does not allow for drawing causal conclusions from our findings. Fourth, in this study no other measures of dysfunctional cognitions were obtained. It would be interesting to investigate how EMSs relate to depressive symptoms over a course of treatment, relative to measures of dysfunctional surface cognitions, like automatic thoughts. Fifth, the sample in the current study was characterized by relatively severe levels of depression and hence the range of BDI-II scores was restricted, which might have led to an underestimation of correlation coefficients between BDI-II and EMSs scores. Finally, we did not assess the recently identified EMS approval-seeking/recognition-seeking, negativity/pessimism, and punitiveness that are covered by the latest version of the SQ (Young, 2006). Future research on the relation between EMS and depressive symptoms should also assess these additional EMS.

5.2. Clinical implications

Despite these limitations the present study has important implications for clinical settings and future research. First, we found that specific EMSs were related to depressive symptom severity in depressed patients. This finding needs further replication in more controlled settings with clinical control groups in order to determine the specificity of these EMSs to depression. We also found that schema domains at pre-treatment were related to change in depressive symptom severity over the course of treatment. Therefore, it might be valuable, for prognostic reasons, to assess EMSs prior to

treatment. Future studies should also address the causal direction of the relation between EMSs and change in depressive symptoms. For example, it would be interesting to test whether change in EMSs is a possible mechanism that leads to improvement from depressive symptoms, as theory would suggest.

Our results suggest that EMSs in depressed patients remain relatively stable in the context of change in depressive symptoms during evidence-based short-term treatments for depression. One consequence might be that patients leave treatment with reduced symptomatology but with a largely unaltered underlying vulnerability for future depressive episodes. This might be especially problematic for depressed patients with high levels of EMSs and might lead to an increased risk for subsequent relapse. For example, it has been shown that chronically depressed patient exhibits statistically significantly higher scores on all schema domains as compared to non-chronically depressed patients (Riso et al., 2003). Given that EMSs are likely to represent a core vulnerability factor to psychopathology, depressed patients with highly dysfunctional EMSs (i.e., chronically depressed patients) might benefit from long-term treatments that are specifically designed to alter underlying EMSs, such as schema-focused therapy (Young et al., 2003).

In conclusion, the current study provides further empirical support that specific EMSs are related to depressive symptoms and that these dysfunctional schemas are robust to change, even in the context of evidence-based outpatient treatment for depression. Moreover, our findings suggest that specific schema domains assessed before treatment predict depressive symptom severity 16-weeks after the initial assessment. Replication of these findings in more controlled settings is needed.

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Conflict of interest

None of the authors to this manuscript has any potential conflict of interest or had any potential conflict of interest, including any financial, personal, or other relationship with people or organizations during the past three years that might be interpreted as influencing our research.

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