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Vulnerability to Depression: Reexamining State Dependence and Relative Stability

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Treatment-related decreases in Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) scores have been interpreted as evidence that dysfunctional attitudes are state-dependent concomitants of depression. Data from the National Institute of Mental Health Treatment of Depression Collaborative Research Program were used to reexamine the stability of dysfunctional attitudes. Mean scores for Perfectionism, Need for Approval, and total DAS decreased after 16 weeks of treatment. However, test–retest correlations showed that the DAS variables displayed considerable relative stability. Structural equation models demonstrated that dysfunctional attitudes after treatment were significantly predicted by initial level of dysfunctional attitudes as well as by posttreatment depression. The relative stability of dysfunctional attitudes was even higher during the 18-month follow-up period. The results were consistent with Beck's (1967) and Blatt's (1974) theories of vulnerability.

Blatt's (1974, 1990) and Beck's (1967) theories of vulnerability to depression have been widely influential, yet their basic assumptions remain controversial. Blatt described two personality variables, dependency and self-criticism, that were said to be associated with both chronic dysphoria and increased risk for experiencing major depression in response to stressful events. Beck's earliest statement of his cognitive theory postulated stable cognitive schemas, having their origin in childhood experiences, whose activation by stressful events leads to depression. The concept of dysfunctional attitudes became more prominent in later statements of the theory (e.g., Beck, Rush, Shaw, & Emery, 1979), with dysfunctional attitudes playing a similar role to that of schemas. Most recently, Beck (1983) distinguished two "modes" of depression, the sociotropic and autonomous, which are similar to Blatt's (1974) concepts of dependent and self-critical depression. Sociotropy and autonomy are believed to be associated with distinctive clusters of dysfunctional attitudes (Beck, 1983).

Despite their origins in different intellectual traditions, Blatt's and Beck's theories are similar in many respects (Blatt & Maroudas, 1992; Nietzel & Harris, 1990). Both theories postulate relatively stable personality or cognitive characteristics that confer vulnerability to stress. Cross-sectional studies comparing depressed and nondepressed persons' personalities or cognitions have provided weak tests of vulnerability theories because differences may have reflected concomitants of the depressed state

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The National Institute of Mental Health (NIMH) Treatment of Depression Collaborative Research Program was a multisite program initiated and sponsored by the Psychosocial Treatments Research Branch, Division of Extramural Research Programs (now part of the Mood, Anxiety, and Personality Disorders Research Branch, Division of Clinical Research), NIMH. The program was funded by cooperative agreements to six participating sites: George Washington University, MH 33762; University of Pittsburgh, MH 33753; University of Oklahoma, MH 33760; Yale University, MH 33827; Clarke Institute of Psychiatry, MH 38231; and Rush Presbyterian–St. Luke's Medical Center, MH 35017. The principal NIMH collaborators were Irene Elkin, Coordinator; M. Tracie Shea, Associate Coordinator (formerly of George Washington University); John P. Docherty (now at Nashua Brookside Hospital); and Morris B. Parloff (now at American University). The principal investigators and project coordinators at the three participating research sites were, at George Washington University, Stuart M. Sotsky and David Glass; at the University of Pittsburgh, Stanley D. Imber and Paul A. Pilkonis; and at the University of Oklahoma, John T. Watkins and William Leber. The principal investigators and project coordinators at the three research sites responsible for training therapists were, at Yale University, Myrna Weissman (now at Columbia University), Eve Chevron, and Bruce J. Rounsaville; at the Clarke Institute of Psychiatry, Brian F. Shaw and T. Michael Vallis; and at Rush Presbyterian–St. Luke's Medical Center, Jan A. Fawcett and Phillip Epstein. Collaborators in the data management and data analysis aspects of the program were C. James Klett, Joseph F. Collins, and Roderic Gillis of the Veterans Administration Studies Program, Perry Point, Maryland.

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rather than predisposing factors. Prospective designs of nondepressed, hypothetically vulnerable individuals are preferable, but they are difficult to implement. Researchers have therefore turned to treatment studies in which depressed individuals' scores on putative vulnerability measures can be compared before and after treatment. If vulnerability scores decrease as the depressions remit, it can be argued that they are merely concomitants of depression. Conversely, if these variables are stable over the course of treatment, they remain viable candidates as predisposing factors, although their causal status remains to be established.

Because the stability of vulnerability variables is such a fundamental issue, numerous studies of treated depressives have been conducted, most using the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) to operationalize Beck's (Beck et al., 1979) concepts. One finding was consistent across all of these studies: Mean scores on the DAS were lower after treatment. Because DAS scores fluctuate with clinical state, the DAS is frequently described as "state dependent." Some studies have found that posttreatment DAS scores of remitted depressed patients were no higher than those of nondepressed controls (e.g., Dohr, Rush, & Bernstein, 1989, Study 1; Hamilton & Abramson, 1983), whereas other studies have found that their DAS scores remained elevated compared with controls' (Eaves & Rush, 1984; Peselow, Robins, Block, Barouche, & Fieve, 1990). Small sample sizes and inconsistencies across studies in the definition of *remission* complicate the interpretation of this literature. Nevertheless, reviewers have been impressed by the changes in DAS scores and have interpreted the literature as damaging to the cognitive theory, or at least as requiring clarification of the theory (Barnett & Gotlib, 1988; Coyne & Gotlib, 1983; Haaga, Dyck, & Ernst, 1991; Segal & Ingram, 1994).

Added complexity is introduced by the fact that stability over time can be conceptually and operationally defined in two distinct ways (Santor, Bagby, & Joffe, 1997). Researchers can examine changes in mean score by using analysis of variance (ANOVA), or they can examine relative stability (stability in participants' relative standing on a trait) by using correlational techniques. It is possible for a group to show large, significant changes in mean scores on a trait in the presence of perfect stability in the participants' relative standing on the trait.

This article examines changes in mean scores and relative stability of the DAS by using data from the National Institute of Mental Health (NIMH) Treatment of Depression Collaborative Research Program (TDCRP; Elkin, 1994; Elkin et al., 1989). The DAS and multiple measures of depression were administered before and after the 16-week treatment period, and 6, 12, and 18 months after the end of treatment. We examined stability during the treatment period (from Week 0 to Week 16) and the follow-up period (from Week 16 to the follow-up at 18 months).

We used three data-analytic strategies. First, we examined changes in mean DAS scores during treatment and follow-up. Second, we calculated zero-order correlations between the measures of depression and dysfunctional attitudes. Concurrent correlations between depression and dysfunctional attitudes assessed the state dependence effect; test–retest correlations assessed relative stability. Third, we calculated structural equation models (SEMs) to evaluate explicitly the magnitude of both relative stability effects and state dependence effects. Relative stability was represented by autoregressive paths from scores at one point in time to scores on the same variable at the next point in time. State dependence was represented by paths from depression to dysfunctional attitudes measured at the same point in time, for example, from depression at termination to dysfunctional attitudes at termination.

Predictions from three theoretical models were evaluated. The pure trait model requires that predisposing variables demonstrate high levels of relative stability and no significant state dependence. In terms of SEMs, the pure trait model predicts a large, significant relative stability parameter and a nonsignificant parameter for the state dependence effect. The first model represents cognitive theories as interpreted by their early critics (e.g., Coyne & Gotlib, 1983). The pure state dependence model requires the opposite: a small, nonsignificant relative stability parameter and a large, significant state dependence parameter. This model represents the strong form of the critique of cognitive theories.

The third model is based on interpretations of mood state dependence effects advanced by Persons and Miranda (1992), Riskind and Rholes (1984), Segal and Ingram (1994), and Teasdale (1983). This model rests on two assumptions. First, there exist persistent individual differences in the *availability* of negative cognitive–affective structures. In recent writings, such structures have been referred to as *cognitive–affective schemas* (Blatt, Auerbach, & Levy, 1997) and *modes* (Beck, 1996). Individuals differ in the number, intensity, and interconnectedness of negative cognitive–affective structures. These structures are stored in the brain and continue to exist regardless of clinical state. The persistence of the structures gives rise to consistency in the rank ordering of individuals on measures of vulnerability, that is, to relative stability. Second, continual fluctuations take place within individuals in the *accessibility* of these structures. Accessibility is affected by multiple factors, including present mood, social context, and biological processes. The vulnerability can remain inaccessible—in practice, undetectable—until psychological, social, or biological processes increase its accessibility sufficiently that it can be detected on self-report measures such as the DAS. Thus, it is theoretically possible for a remitted depressed patient with a normal score on a vulnerability measure to continue to possess the vulnerability. Because the third model postulates both stable differences in availability and fluctuating differences in accessibility, it is referred to as the state–trait vulnerability model.[1]

The state–trait vulnerability model is more consistent with Beck's (1967) and Blatt's (1974) theories than the pure trait model that is sometimes attributed to them. In his original theoretical statement, Beck (1967) wrote, "Even though these attitudes (or concepts) may not be prominent or even discernable at a given time, they persist in a latent state like an explosive charge ready to be detonated by an appropriate set of conditions. Once activated, these concepts dominate the person's thinking and lead to the typical depressive symptomatology" (p. 277). The image of "la-

[1] Drawing on both psychoanalytic developmental theory and Piagetian cognitive–developmental theory Blatt's (1974; Blatt et al., 1997) theory is more developmental in focus than Beck's (1967). According to Blatt, vulnerable individuals are characterized not only by the negative content of their cognitive–affective schemas but also by the relative immaturity of those schemas. Negative representations of self and other are often less differentiated, less well integrated, and at a lower conceptual level. The associated affects are more intense and less well modulated. Activation of these schemas implies a regressive shift toward less mature modes of response, often associated with an increase in negative content.

tent" attitudes and schemas are prominent in Beck's later writings as well (e.g., Beck, 1987; Kovacs & Beck, 1978).

Most recently, Beck (1996) has de-emphasized the causal role of cognition, suggesting instead that the cognitive, affective, motivational, behavioral, and physiological symptoms of depression are linked together as a "mode." Modes are said to vary in activation (or "charge" or "cathexis"). When the mode is highly charged, the individual experiences an episode of depression; the mode continues to exist, but in a deactivated state, after an episode of depression remits. Beck (1996) distinguished deactivating a mode from eliminating or modifying a mode. Deactivation can occur for many reasons, including pharmacological treatment; modification of modes ordinarily requires psychotherapeutic intervention.

Blatt (Blatt & Maroudas, 1992) has placed greater emphasis on the long-term stability of personality than has Beck. Nevertheless, he allowed that environmental stressors can activate and intensify intrapsychic conflicts and that, conversely, a supportive environment or successful psychotherapy can deactivate or modify maladaptive character traits. The activation of negative cognitive–affective structures, derived from earlier experiences and characterized by a relatively low cognitive-developmental level, would be described in psychoanalytic terminology as *regression* (Blatt, 1974; Blatt & Shichman, 1983; Blatt et al., 1997).

In summary, Blatt and Beck each recognized that vulnerabilities have stable, traitlike components and fluctuating, statelike components. Their theories are most consistent with the state–trait vulnerability model. Consequently, both the state dependence and relative stability parameters would be expected to be significant.

We planned to examine the relative stability and state dependence of dysfunctional attitudes during the follow-up period as well as the treatment period of the TDCRP. To avoid restricting the range of depression at 18 months and consequently limiting the size of the state dependence parameter, we included in these analyses all available participants, regardless of whether they were in remission or relapsed. Both depression and dysfunctional attitudes were expected to show greater mean changes during the treatment period than during the follow-up period. Larger mean changes in depression and dysfunctional attitudes during treatment would be expected to lead to more frequent alterations in patients' relative standing and consequently to decreased relative stability. Therefore, it was predicted that the relative stability parameters would be larger for the follow-up period than the treatment period.

Method

The TDCRP tested the efficacy of cognitive–behavior therapy, interpersonal therapy, imipramine plus clinical management, and placebo plus clinical management for outpatients with nonbipolar, nonpsychotic, major depressive disorders. The participants were 250 patients who were randomly assigned to the four conditions. Of the 250 patients, 239 began treatment, and 162 were defined as "completers," having received at least 12 treatment sessions over at least a 15-week period.

Inclusion and exclusion criteria, sample characteristics, treatment procedures, and assessment procedures have been described in previous publications (Elkin, 1994; Elkin et al., 1989; Imber et al., 1990; Sotsky et al., 1991; Watkins et al., 1993). Patients met Research Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1978) for a current episode of definite major depression that had been present for at least the previous 2 weeks. Among the patients who began treatment, 70% were female, 38% were *definite endogenous* by RDC criteria, and 64% had had one or more prior episodes of major depression. The average age was 35. Complete data were available at Weeks 0 and 16 for 154 patients. Because of attrition during follow-up, the sample for analyses spanning termination (Week 16) to 18 months was reduced to 142 patients.

Dysfunctional Attitudes

The 40-item DAS is intended to measure cognitive vulnerability to depression. Previous analyses of the TDCRP data have used both the total score and the Perfectionism and Need for Approval subscales. The subscales were derived from the intake data by principal-components analysis, followed by varimax rotation (Imber et al., 1990). Need for Approval is conceptually related to Blatt's (1974) construct of dependency and to Beck's (1983) construct of sociotropy. Perfectionism is conceptually related to self-criticism and to autonomy. Although these constructs are not interchangeable (Blatt & Maroudas, 1992; Zuroff, 1994), there are substantial correlations between measures of dependency, sociotropy, and need for approval and smaller, but still significant, correlations between measures of self-criticism, autonomy, and perfectionism (Blaney & Kutcher, 1991; Zuroff, 1994).

Imber et al. (1990) found that 11 items loaded substantially (>.40) on Need for Approval and that 15 items loaded substantially on Perfectionism. The two highest loading items for Need for Approval were "What other people think of me is important" and "I can find happiness without being loved by another person." The corresponding items for Perfectionism were "If I do not do as well as other people, it means that I am an inferior human being" and "If I fail at my work, then I am a failure as a person." The items with high loadings were summed, and the resulting composites had high internal consistency ($\alpha = .91$ for Need for Approval and .82 for Perfectionism). The two factors were congruent with previous factor analyses of the DAS (Cane, Olinger, Gotlib, & Kuiper, 1986; Oliver & Baumgart, 1985) and with Mongrain and Zuroff's (1989a) rationally derived subscales.

The two subscales were moderately correlated at intake in the total sample ($r = .59, p < .001$). Need for Approval and Perfectionism therefore share considerable variance, but each has unique variance as well. Depending on the research question, investigators can focus on the shared variance or treat Need for Approval and Perfectionism as distinct variables.

Self-Reported Depression

Two self-report indicators of depression were used: the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Depression subscale of the Hopkins Symptom Checklist–90 (SCL–D; Derogatis, Lipman, & Covi, 1973). The BDI is a widely used 21-item inventory of the affective, cognitive, motivational, and somatic symptoms of depression. Extensive research has demonstrated that it is reliable and correlates well with self-report and interviewer-based measures of depression (Gotlib & Cane, 1989; Shaw, Vallis, & McCabe, 1985). The 13-item SCL–D assesses primarily the affective and cognitive symptoms of depression. It is internally consistent and sensitive to changes in response to treatment (Rabkin & Klein, 1987).

Clinical Evaluator-Rated Depression

At each point in time, patients were assessed by the same clinical evaluator who had screened them for participation in the study. The clinical evaluators conducted a semistructured interview, using the the Schedule for Affective Disorders and Schizophrenia—Change Version (SADS–C; Endicott, Cohen, Nee, Fleiss, & Sarantakos, 1981). On the basis of this interview, evaluators completed the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960, 1967). We present data for the 17-item version of the HRSD, as have previous researchers using the TDCRP data (Elkin, 1994). The evaluators also recorded patients' responses to each of the questions on the SADS–C. The original TDCRP researchers calculated scores for a number of subscales. We used two of these subscales, the Depressive Syndrome (SADS–DS) and the Extracted Hamilton

Table 1
Means, Standard Deviations, and F Tests for Change During Treatment and Follow-Up in Measures of Depression and Dysfunctional Attitudes

Variable	Week 0 (N = 154)		Week 16 (N = 154)			Week 16 (N = 142)		18 Months (N = 142)		
	M	*SD*	*M*	*SD*	$F(1, 153)$[a]	*M*	*SD*	*M*	*SD*	$F(1, 141)$[b]
Self-reported depression										
BDI	26.84	7.89	8.74	8.76	483.55	8.17	8.03	8.23	8.97	0.01
SCL–D	2.50	0.65	0.79	0.72	592.95	0.75	0.69	0.83	0.82	1.40
CE-rated depression										
HRSD	19.12	4.06	7.43	5.73	505.41	7.20	5.61	7.31	6.03	0.04
SADS–EH	17.85	4.76	7.21	4.93	421.80	7.03	4.84	7.45	5.54	0.62
SADS–DS	41.74	5.93	22.74	8.68	578.55	22.23	8.23	23.22	9.31	1.20
Dysfunctional attitudes										
Perfectionism	50.62	17.31	39.05	16.69	101.34	38.53	16.54	38.20	16.21	0.12
Need for Approval	45.81	12.06	37.01	11.65	96.01	36.65	11.79	36.34	12.19	0.15
Total DAS	141.56	36.04	113.29	36.01	135.70	111.97	35.85	110.57	34.37	0.47

Note. BDI = Beck Depression Inventory; SCL–D = Symptom Checklist–90 Depression subscale; CE = clinical evaluator; HRSD = Hamilton Rating Scale for Depression; SADS–EH = Schedule for Affective Disorders and Schizophrenia—Extracted Hamilton subscale; SADS–DS = Schedule for Affective Disorders and Schizophrenia—Depressive Syndrome subscale; DAS = Dysfunctional Attitudes Scale.
[a] All Fs for changes from 0 to 16 weeks were significant ($p < .001$). [b] None of the Fs for change from 16 weeks to 18 months were significant.

(SADS–EH). The SADS–DS included 16 items that sample a wide range of depressive symptoms (e.g., self-reproach, discouragement, lack of energy, and psychomotor retardation). The SADS–EH was developed by Endicott et al. (1981) as an approximation to the HRSD. It combines the 17 SADS–C items that are most similar to the HRSD items. Eight items occur on both the SADS–DS and the SADS–EH.

Results

We begin by examining changes in mean scores during the treatment and follow-up periods. We then present zero-order correlations, focusing first on concurrent correlations between dysfunctional attitudes and depression as indicators of state dependence and then on test–retest correlations as indicators of relative stability. Finally, we test SEMs that postulate both relative stability and state dependence.

Changes in Mean Scores During Treatment and Follow-Up

Table 1 presents means, standard deviations, and F tests of the significance of change. There were significant decreases during the treatment period on all five measures of depression as well as on Perfectionism, Need for Approval, and total DAS. These results are consistent with previous reports that dysfunctional attitudes decrease during treatment of depression. However, total DAS scores at termination remained elevated compared with means for nondepressed community control participants reported by Peselow et al. (1990), Eaves and Rush (1984), and Hamilton and Abramson (1983).[2] The depression scores at termination suggest the presence of residual depression and raise the possibility that total DAS scores in complete responders would be closer to normal levels.

Following Elkin et al. (1989), we defined complete responders as those with Week 16 HRSD scores of 6 or less and partial responders as those with HRSD scores of 7 to 11. These criteria identified 76, 46, and 32 participants in the complete, partial, and nonresponse groups, respectively. Total DAS scores were then subjected to an ANOVA with response group (complete, partial, none) and time (Week 0 to Week 16) as variables. The main effect for time was significant, indicating a marked decrease in total DAS across the groups, but it was qualified by a significant Response Group × Time interaction, $F(2, 151) = 3.78, p < .05$. Table 2 reveals that the complete responders showed the greatest reduction in dysfunctional attitudes. At termination, the mean DAS score for the complete responders was in the same range as normal community controls.

There were no significant changes in mean scores for any of the variables from the end of treatment (Week 16) to the follow-up testing 18 months later.

Correlational Analyses

Concurrent relations between depression and dysfunctional attitudes. Tables 3 and 4 present the zero-order correlations. Data for the treatment period are presented above the diagonals; data for the follow-up period are presented below the diagonals. At both termination (16 weeks) and the 18-month follow-up, correlations between measures of depression and dysfunctional attitudes were significant and moderately large, as would be predicted by the state dependence model. Surprisingly, the concurrent correlations at intake were smaller and in some cases not significant.[3] It is possible that the magnitude of the relation between depression and

[2] We searched for studies reporting test–retest data on nondepressed participants who were, if not matched to depressed participants, at least community-resident adults rather than college students. Surprisingly, we found only these three studies. Peselow et al. (1990) used Form B of the DAS, whereas the TDCRP used Form A of the DAS. Hamilton and Abramson (1983) used both forms. However, the two forms are simply subsets of the original 100-item DAS. They have highly similar means and can reasonably be compared with one another (Weissman, 1979).

[3] The smaller correlations at intake are probably not attributable to restricted variability because the standard deviations of the measures of depression and dysfunctional attitudes were similar at the three points in time. The unstandardized regression coefficients for the regressions of dysfunctional attitudes on depression displayed the same pattern as the correlation coefficients; that is, at intake, they were smaller but generally significant.

Table 2
Total Dysfunctional Attitudes in the Complete, Partial, and Nonresponse Groups and Nondepressed Community Controls

Group	N	Week 0 M	Week 0 SD	Week 16 M	Week 16 SD
Nonresponse	32	149.75	38.02	133.09	38.25
Partial	46	151.28	36.31	123.96	35.64
Complete	76	132.22	32.96	98.50	28.64
Normal controls[a]	22	99.46	22.7	96.05	22.9
Normal controls[b]	17	102.6	19.2	95.5	17.0
Normal controls[c]	20	105.1	20.3	101.5	18.8

[a] Data for community controls are from the study by Peselow et al. (1990). Dysfunctional Attitudes Scale (DAS) Form B was used. The test–retest interval ranged from 3–6 weeks. [b] Data for community controls are from the study by Eaves and Rush (1984). Testings with DAS Form A were separated by an average of about 9 weeks. [c] Data for community controls are from the study by Hamilton and Abramson (1983). DAS Forms A and B were administered in counterbalanced order separated by about 17 days.

dysfunctional attitudes varies depending on the range of depression, which was high at intake and lower at the two subsequent testings.

Test–retest correlations. Measures of depression displayed little stability during the treatment period, with test–retest *r*s ranging from .12 (SAD–EH) to .25 (BDI). These correlations reflected the considerable variability in participants' responses to treatment. Some participants who were initially high on depression responded well to treatment, whereas others responded less favorably. Consequently, depression at intake only modestly predicted depression at termination. Dysfunctional attitudes displayed much higher relative stability, with test–retest *r*s of .65 (Perfectionism), .56 (Need for Approval), and .65 (total DAS).

Compared with the treatment period, test–retest correlations during the follow-up period were higher for both depression and dysfunctional attitudes. The stability correlations for measures of depression were all significant, ranging from .25 for the SAD–EH to .46 for the SCL. Measures of dysfunctional attitudes were again highly stable, with test–retest *r*s of .76 (Perfectionism), .68 (Need for Approval), and .76 (total DAS).

In summary, the correlational analyses demonstrated that over the course of treatment, depressed individuals remained quite stable in their relative levels of dysfunctional attitudes, despite substantial changes in mean levels of depression and dysfunctional attitudes. The follow-up period was characterized by small, nonsignificant changes in mean scores and substantial temporal stability, especially for dysfunctional attitudes.

The Relation of Depression and Dysfunctional Attitudes: SEMs

Analyses were carried out using AMOS 3.6 (Arbuckle, 1997), which, like LISREL (Jöreskog & Sörbom, 1989), uses maximum-likelihood estimation to test the fit of a hypothesized model to the observed variance–covariance matrix. AMOS generates a variety of indices for evaluating fit, including the chi-square test and critical ratios for parameter estimates. Models with chi-square/degrees of freedom ratios of less than two are considered acceptable. Critical ratios are the ratios of parameter estimates to estimates of the standard error for the parameter; probability levels are obtained from normal distribution (*z*-score) tables. We also report Jöreskog and Sörbom's (1984) goodness-of-fit index (GFI) and Bentler's (1990) comparative fit index (CFI). GFI measures how well the model reproduces the observed covariance matrix and is analogous to R^2 in multiple regression. GFI has a maximum value of 1; values over .9 are generally accepted as indicating good fit. CFI assesses the degree to which a model's fit is an improvement to the fit of the "null" or independence model. CFI varies from 0 to 1, with values over .9 conventionally deemed acceptable.

Four structural models were tested. The first model described the relations between dysfunctional attitudes and self-report measures of depression at Week 0 and Week 16. The third model described the relations between dysfunctional attitudes and self-reported depression during the follow-up period. The second and fourth models used the clinical evaluator measures in place of the self-report measures of depression. These last two models were expected to produce smaller estimates of the state dependence parameter because the indicators of depression and dysfunctional attitudes did not share any method variance.

As is common practice in modeling longitudinal data, the measurement models included covariances between the unique variances for each indicator measured at different points in time. These covariances reflect the likelihood that correlations between indicator variables measured at Times 1 and 2 will be only partly

Table 3
Correlations of Self-Report Measures of Depression and Dysfunctional Attitudes During Treatment and Follow-Up Periods

Variable	1	2	3	4	5	6	7	8
1. BDI, Week 0 (AD)/Week 16 (BD)	—	**.25****	.64***	.19*	.22**	.13	.25**	.15
2. BDI, Week 16 (AD)/18 months (BD)	**.43*****	—	.20*	.88***	.28***	.57***	.18*	.47***
3. SCL–D, Week 0 (AD)/Week 16 (BD)	.86***	.40***	—	**.19***	.11	.12	.23**	.19*
4. SCL–D, Week 16 (AD)/18 months (BD)	.41***	.90***	**.46*****	—	.28***	.54***	.18*	.49***
5. Perfectionism, Week 0 (AD)/Week 16 (BD)	.57***	.26**	.53***	.26**	—	**.65*****	.60***	.47***
6. Perfectionism, Week 16 (AD)/18 months (BD)	.44***	.49***	.44***	.45***	**.76*****	—	.39***	.75***
7. Need for Approval, Week 0 (AD)/Week 16 (BD)	.43***	.19*	.46***	.21*	.76***	.58***	—	**.56*****
8. Need for Approval, Week 16 (AD)/18 months (BD)	.35***	.42***	.35***	.40***	.58***	.67***	**.68*****	—

Note. Numbers above the diagonal (AD) represent the correlations of self-report measures of depression and dysfunctional attitudes at Week 0 and Week 16. Numbers below the diagonal (BD) represent the correlations of self-report measures of depression and dysfunctional attitudes at Week 16 and 18 months. Test–retest correlations are in boldface. BDI = Beck Depression Inventory; SCL–D = Symptom Checklist–90 Depression subscale.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4
Correlations of Interviewer Measures of Depression and Dysfunctional Attitudes During Treatment and Follow-Up Periods

Variable	1	2	3	4	5	6	7	8	9	10
1. HRSD, Week 0 (AD)/Week 16 (BD)	—	**.16***	.71***	.14	.74***	.15	−.04	−.05	.12	.03
2. HRSD, Week 16 (AD)/18 months (BD)	**.30*****	—	.11	.89***	.10	.92***	.25**	.43***	.11	.41***
3. SADS-EH, Week 0 (AD)/Week 16 (BD)	.88***	.23**	—	**.12**	.69***	.09	.04	−.02	.24**	.11
4. SADS-EH, Week 16 (AD)/18 months (BD)	.28***	.89***	**.25****	—	.07	.87***	.26***	.46***	.14	.43***
5. SADS-DS, Week 0 (AD)/Week 16 (BD)	.91***	.27**	.86***	.25**	—	**.14**	.12	.05	.24**	.15
6. SADS-DS, Week 16 (AD)/18 months (BD)	.24**	.92***	.18*	.89***	**.26****	—	.32***	.51***	.16*	.45***
7. Perfect, Week 0 (AD)/Week 16 (BD)	.41***	.10	.45***	.10	.48***	.13	—	**.65*****	.60***	.47***
8. Perfect, Week 16 (AD)/18 months (BD)	.29***	.30***	.30***	.27**	.35***	.34***	**.76*****	—	.39***	.75***
9. NFA, Week 0 (AD)/Week 16 (BD)	.38***	−.03	.40***	.02	.42***	.03	.76***	.58***	—	**.56*****
10. NFA, Week 16 (AD)/18 months (BD)	.18*	.21*	.20*	.24**	.23**	.25**	.58***	.67***	**.68*****	—

Note. Numbers above the diagonal (AD) represent correlations of interviewer measures of depression and dysfunctional attitudes at Week 0 and Week 16. Numbers below the diagonal (BD) represent correlations of interviewer measures of depression and dysfunctional attitudes at Week 16 and 18 months. Test–retest correlations are in boldface. HRSD = Hamilton Rating Scale for Depression; SADS–EH = Schedule for Affective Disorders and Schizophrenia—Extracted Hamilton subscale; SADS–DS = Schedule for Affective Disorders and Schizophrenia—Depressive Syndrome subscale; Perfect = Perfectionism; NFA = Need for Approval.
* $p < .05$. ** $p < .01$. *** $p < .001$.

explained by relations between the underlying latent variable at Times 1 and 2.

The structural component of each model included the covariance between depression and dysfunctional attitudes at Time 1 and three paths: (a) the autoregressive path from Time 1 depression to Time 2 depression; (b) the autoregressive path from Time 1 dysfunctional attitudes to Time 2 dysfunctional attitudes; and (c) the synchronous path from Time 2 depression to Time 2 dysfunctional attitudes. The first two paths assessed the stability of depression and dysfunctional attitudes. The third assessed the influence of concurrent depression on dysfunctional attitudes, that is, the state dependence effect.

Standardized and unstandardized parameter estimates and their critical ratios are presented in Tables 5–8. Figures 1 and 2 present the standardized parameters in the structural components of the models. Parameters from the models using clinical evaluator measures are shown in parentheses.

Dysfunctional attitudes and self-reported depression during treatment. This model included a path from dysfunctional atti-

Table 5
Parameter Estimates From Model Relating Dysfunctional Attitudes and Self-Report Measures of Depression at Week 0 and Week 16

Parameter	Unstandardized	*SE*	*C.R.*	Standardized
Factor loading				
Dep0wk → BDI	1.000[a]			.914
Dep0wk → SCL–D	0.063	0.019	3.400***	.702
Dys0wk → PFT	1.801	0.334	5.394***	.866
Dys0wk → NFA	1.000[a]			.693
Dep16wk → BDI	1.000[a]			.958
Dep16wk → SCL–D	0.078	0.005	14.420***	.915
Dys16wk → PFT	1.607	0.163	9.878***	.922
Dys16wk → NFA	1.000[a]			.816
Covariance				
BDI0wk ↔ BDI16wk	4.028	2.453	1.642	.503
SCL–D0wk ↔ SCL–D16wk	0.000	0.016	0.028	.003
PFT0wk ↔ PFT16wk	39.153	18.838	2.078*	.708
NFA0wk ↔ NFA16wk	28.283	8.168	3.463***	.486
Structural model				
Dep0wk ↔ Dys0wk	18.170	6.584	2.760**	.304
Dep0wk → Dep16wk	0.165	0.117	1.417	.141
Dys0wk → Dys16wk	0.545	0.095	5.756***	.477
Dep16wk → Dys16wk	0.553	0.087	6.359***	.488
Dys0wk → Dep16wk	0.285	0.100	2.859**	.282

Note. Double-headed arrow indicates a covariance. Covariances for measures of the same variable at two points in time refer to covariances between the unique variances at each time point. Single-headed arrow indicates a factor loading in the measurement model or a path in the structural model. *SE* = standard error of parameter; *C.R.* = critical ratio for parameter; Dep = depression latent variable; wk = weeks; BDI = Beck Depression Inventory; SCL–D = Symptom Checklist–90 Depression subscale; Dys = dysfunctional attitudes latent variable; PFT = Perfectionism; NFA = Need for Approval.
[a] Unstandardized factor loading is fixed at 1.0 to achieve identifiability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6
Parameter Estimates From Model Relating Dysfunctional Attitudes and Interviewer Measures of Depression at Week 0 and Week 16

Parameter	Unstandardized	*SE*	*C.R.*	Standardized
Factor loading				
Dep0wk → HRSD	1.000[a]			.862
Dep0wk → SADS–EH	1.116	0.095	11.692***	.820
Dep0wk → SADS–DS	1.445	0.118	12.208***	.852
Dys0wk → PFT	1.723	0.361	4.767***	.852
Dys0wk → NFA	1.000[a]			.704
Dep16wk → HRSD	1.000[a]			.960
Dep16wk → SADS–EH	0.829	0.036	23.276***	.921
Dep16wk → SADS–DS	1.515	0.056	27.278***	.954
Dys16wk → PFT	1.453	0.175	8.282***	.878
Dys16wk → NFA	1.000[a]			.858
Covariance				
HRSD0wk ↔ HRSD16wk	0.163	0.449	0.364	.050
SADS–EH0wk ↔ SADS–EH16wk	0.816	0.554	1.474	.157
SADS–DS0wk ↔ SADS–DS16wk	2.518	1.049	2.401*	.312
PFT0wk ↔ PFT16wk	46.702	20.359	2.294*	.653
NFA0wk ↔ NFA16wk	26.108	9.320	2.801**	.509
Structural model				
Dep0wk ↔ Dys0wk	3.636	2.938	1.237	.123
Dep0wk → Dep16wk	0.167	0.134	1.252	.107
Dys0wk → Dys16wk	0.615	0.100	6.145***	.523
Dep16wk → Dys16wk	0.702	0.132	5.335***	.384
Dys0wk → Dep16wk	0.186	0.061	3.038**	.289

Note. Double-headed arrow indicates a covariance. Covariances for measures of the same variable at two points in time refer to covariances between the unique variances at each time point. Single-headed arrow indicates a factor loading in the measurement model or a path in the structural model. *SE* = standard error of parameter; *C.R.* = critical ratio for parameter; Dep = depression latent variable. wk = weeks; HRSD = Hamilton Rating Scale for Depression; SADS–EH = Schedule for Affective Disorders and Schizophrenia—Extracted Hamilton subscale; SADS–DS = Schedule for Affective Disorders and Schizophrenia—Depressive Syndrome subscale; Dys = dysfunctional attitudes latent variable. PFT = Perfectionism; NFA = Need for Approval.
[a] Unstandardized factor loading is fixed at 1.0 to achieve identifiability.
* $p < .05$. ** $p < .01$. *** $p < .001$.

tudes at Time 1 to depression at Time 2 in addition to the state dependence and relative stability paths. The path was added because Peselow et al. (1990) found that high levels of dysfunctional attitudes predicted poorer response to treatment. The fit of the model was satisfactory according to all criteria, $\chi^2(11, N = 154) = 14.06$, $p > .20$, $\chi^2/df = 1.23$, GFI = .98, CFI = 1.00.

These results support the predictions derived from the state–trait vulnerability model (see Figure 1). Dysfunctional attitudes were both significantly state dependent and significantly stable over the course of treatment; the two crucial parameters were moderately large and similar in size. As in Peselow et al.'s (1990) study, higher levels of dysfunctional attitudes at the beginning of treatment predicted poorer response to treatment.

Dysfunctional attitudes and interviewer-rated depression during treatment. The fit of this model was satisfactory according to all criteria, $\chi^2(25, N = 154) = 42.69$, $p < .05$, $\chi^2/df = 1.71$, GFI = .95, CFI = .99. The results were very similar to those obtained with the self-report measures of depression, except that, as expected, the magnitude of the state dependence effect was smaller when shared method variance was eliminated.

Dysfunctional attitudes and self-reported depression during follow-up. This model included only the two autoregressive paths for stability and the synchronous path from depression at 18 months to dysfunctional attitudes at 18 months.[4] The initial attempt to fit the model produced an unacceptable solution because the estimated unique variance of the BDI at 18 months was negative. We altered the measurement model by fixing the unique variance of the BDI at 16 weeks to zero and the covariance between the unique variances of the BDI at 16 weeks and 18 months to zero. These modifications were regarded as relatively minor and acceptable because neither of the parameters that were fixed to zero differed significantly from zero in the original model. The fit of this revised model was satisfactory according to all criteria, $\chi^2(14, N = 142) = 12.79$, $p > .50$, $\chi^2/df = .91$, GFI = .98, CFI = 1.00.

Both the state dependence and relative stability parameters were significant during the follow-up period, supporting the predictions based on the state–trait vulnerability model. Figure 2 also reveals that, as expected, both depression and dysfunctional attitudes were more stable during the follow-up period than the treatment period. Depression was moderately stable over the follow-up period, with

[4] There was no prior evidence suggesting the need to include cross-lagged paths, nor did the modification indices produced by AMOS suggest that adding them would improve the model's fit.

Table 7
Parameter Estimates From Model Relating Self-Report Measures of Depression and Dysfunctional Attitudes at Week 16 and at 18 Months

Parameter	Unstandardized	*SE*	*C.R.*	Standardized
Factor loading				
Dep16wk → BDI	1.000[a]			.960
Dep16wk → SCL–D	0.079	0.006	14.301***	.895
Dys16wk → PFT	1.782	0.198	9.018***	.983
Dys16wk → NFA	1.000[a]			.771
Dep18mo → BDI	1.000[a]			1.000
Dep18mo → SCL–D	0.082	0.003	25.848***	.902
Dys18mo → PFT	1.604	0.186	8.618***	.896
Dys18mo → NFA	1.000[a]			.744
Covariance				
SCL–D16wk ↔ SCL–D18mo	0.045	0.011	4.126***	.422
PFT16wk ↔ PFT18mo	13.258	17.074	0.777	.612
NFA16wk ↔ NFA18mo	30.619	8.159	3.753***	.503
Structural model				
Dep16wk ↔ Dys16wk	42.092	8.422	4.998***	.603
Dep16wk → Dep18mo	0.516	0.093	5.525***	.444
Dys16wk → Dys18mo	0.706	0.074	9.505***	.710
Dep18mo → Dys18mo	0.374	0.063	5.928***	.371

Note. Unique variance for BDI at 18 months was fixed at 0.0. Covariance between the unique variance of the BDI at 16 weeks and at 18 months was fixed at 0.0. Double-headed arrow indicates a covariance. Covariances for measures of the same variable at two points in time refer to covariances between the unique variances at each time point. Single-headed arrow indicates a factor loading in the measurement model or a path in the structural model. *SE* = standard error of parameter; *C.R.* = critical ratio for parameter; Dep = depression latent variable; wk = weeks; BDI = Beck Depression Inventory; SCL–D = Symptom Checklist–90 Depression subscale; Dys = dysfunctional attitudes latent variable; PFT = Perfectionism; NFA = Need for Approval; mo = months.
[a] Unstandardized factor loading is fixed at 1.0 to achieve identifiability.
*** $p < .001$.

a standardized parameter of .44, and dysfunctional attitudes were highly stable, with a standardized parameter of .71.

Dysfunctional attitudes and interviewer-rated depression during follow-up. The measurement model using the clinical evaluator data did not require any modifications. The fit of the model was satisfactory according to all criteria, $\chi^2(26, N = 142) = 40.40, p < .05$, $\chi^2/df = 1.55$, GFI = .95, CFI = .99.

The results were similar to those obtained with self-report measures. Dysfunctional attitudes were characterized by both relative stability and state dependence. The stability of depression during follow-up was somewhat lower when assessed by the clinical evaluator but was still greater than during the treatment period. The mood-state dependence path at 18 months remained significant even when shared method variance was eliminated, but the magnitude of the parameter was reduced to .28.

Fit of alternative models. The predictions that both the state dependence and relative stability paths would be significant were confirmed in all four SEMs, providing consistent support for the state–trait vulnerability model. The state–trait vulnerability model and the pure trait and pure state dependence models can also be compared using nested chi-square tests. That is, the fit of the model that includes both paths can be compared with the fit of the model with the state dependence path deleted (pure trait model) and with the fit of the model with the relative stability path deleted (pure state dependence model). Nested chi-square tests were conducted for the treatment period and the follow-up period, using both self-report and clinical evaluator measures of depression. In each case, the state–trait vulnerability model provided a significantly better fit ($ps < .001$) than either alternative model.

Perfectionism and Need for Approval considered separately. State dependence and stability in Perfectionism were examined in a series of SEMs in which the latent variable of dysfunctional attitudes was replaced by the single nonlatent variable of Perfectionism; a corresponding series of SEMs was conducted replacing dysfunctional attitudes with Need for Approval. Because of space limitations, we present results for only the analyses using self-report measures of depression. Results using clinical-evaluator measures were similar.

Predictions based on the state–trait vulnerability model were supported for both types of dysfunctional attitudes, as they had been for overall (latent) dysfunctional attitudes. Each of the relevant parameters was significant ($p < .001$). The relative stability parameters for Perfectionism were .52 for the treatment period and .68 for the follow-up. The state dependence parameters for Perfectionism were .44 at the end of treatment and .32 at 18 months. The relative stability parameters for Need for Approval were .48 for the treatment period and .62 for the follow-up. The state dependence parameters for Need for Approval were .42 at the end of treatment and .30 at 18 months.

Effects of type of treatment. A final set of analyses was conducted to determine whether the strength of the state or relative stability effects differed across the four treatments. Because interaction effects are difficult to assess using SEMs, multiple regression analyses (Cohen & Cohen, 1983) were used instead. Total DAS at 16 weeks was regressed on treatment group, total DAS at intake, BDI at 16 weeks, and the product terms representing the interactions of treatment group and the DAS and BDI. Neither interaction was significant, nor were they significant when the

Table 8
Parameter Estimates From Model Relating Dysfunctional Attitudes and Interviewer Measures of Depression at Week 16 and at 18 Months

Parameter	Unstandardized	*SE*	*C.R.*	Standardized
Factor loading				
Dep16wk → HRSD	1.000[a]			.958
Dep16wk → SADS–EH	0.823	0.038	21.490***	.912
Dep16wk → SADS–DS	1.486	0.056	26.469***	.953
Dys16wk → PFT	1.599	0.202	7.912***	.933
Dys16wk → NFA	1.000[a]			.815
Dep18mo → HRSD	1.000[a]			.957
Dep18mo → SADS–EH	0.894	0.039	22.867***	.923
Dep18mo → SADS–DS	1.565	0.054	28.745***	.966
Dys18mo → PFT	1.539	0.211	7.294***	.887
Dys18mo → NFA	1.000[a]			.758
Covariance				
HRSD16wk ↔ HRSD18mo	0.585	0.422	1.387	.213
SADS–EH16wk ↔ SADS–EH18mo	0.898	0.451	1.989	.213
SADS–DS16wk ↔ SADS–DS18mo	2.750	0.986	2.789**	.455
PFT16wk ↔ PFT18mo	22.522	20.758	1.085	.510
NFA16wk ↔ NFA18mo	26.906	9.713	2.770**	.493
Structural model				
Dep16wk ↔ Dys16wk	25.528	5.702	4.477***	.499
Dep16wk → Dep18mo	0.287	0.091	3.159**	.267
Dys16wk → Dys18mo	0.754	0.077	9.749***	.779
Dep18mo → Dys18mo	0.448	0.102	4.413***	.276

Note. Double-headed arrow indicates a covariance. Covariances for measures of the same variable at two points in time refer to covariances between the unique variances at each time point. Single-headed arrow indicates a factor loading in the measurement model or a path in the structural model. *SE* = standard error of parameter; *C.R.* = critical ratio for parameter; Dep = depression latent variable; HRSD = Hamilton Rating Scale for Depression; wk = weeks; SADS–EH = Schedule for Affective Disorders and Schizophrenia—Extracted Hamilton subscale; SADS–DS = Schedule for Affective Disorders and Schizophrenia—Depressive Syndrome subscale; Dys = dysfunctional attitudes latent variable. PFT = Perfectionism; NFA = Need for Approval; mo = months.
[a] Unstandardized factor loading is fixed at 1.0 to achieve identifiability.
** $p < .01$. *** $p < .001$.

HRSD was used instead of the BDI. Thus, there was no evidence that type of treatment moderated the stability of dysfunctional attitudes.

Discussion

Four principal findings emerged. First, mean scores on Perfectionism, Need for Approval, and total DAS decreased markedly from the beginning of treatment to the end of treatment. Second, Perfectionism, Need for Approval, and total DAS scores each showed high levels of relative stability over the treatment period. Third, the relative stability and state dependence paths were significant and approximately equal in magnitude for the treatment period. Fourth, the relative stability and state dependence paths were both significant during the follow-up period, but the stability parameters were larger than the corresponding parameters for the treatment period. After discussing these four findings, we comment on the negative effects of dysfunctional attitudes on response to treatment and identify advantages and limitations of our data-analytic strategy.

State Dependence of Dysfunctional Attitudes

Mean levels of dysfunctional attitudes were significantly higher at intake than at termination or follow-up. These results replicated previous findings that successful treatment results in substantial reductions in self-reported dysfunctional attitudes. In fact, total DAS scores of fully remitted patients were very similar to those of nondepressed controls.[5] It seems clear that dysfunctional attitudes are state dependent to a significant degree.

The state dependence hypothesis also suggests that depression and dysfunctional attitudes will be correlated within time periods. Significant concurrent correlations were obtained at termination and follow-up, but weaker correlations were found at intake.[6] Any interpretation of this pattern must be regarded as tentative until it is replicated. Nevertheless, it can be noted that the large majority of patients obtained high scores on measures of depression at intake and low scores at termination and follow-up. It is possible that the relation between depression and dysfunctional attitudes is not linear over the entire range of depression; increases in the low to moderate range of depression might be more strongly coupled to increases in dysfunctional attitudes than are increases in the high range of depression. A relationship of that form would lead to smaller correlations between dysfunctional attitudes and depres-

[5] We found that complete responders were initially somewhat lower in dysfunctional attitudes, and this may partly explain their low levels of dysfunctional attitudes after treatment.

[6] The SEMs showed that the latent variables of depression and dysfunctional attitudes were significantly correlated at intake, but the correlation was smaller (.30) than at termination or follow-up.

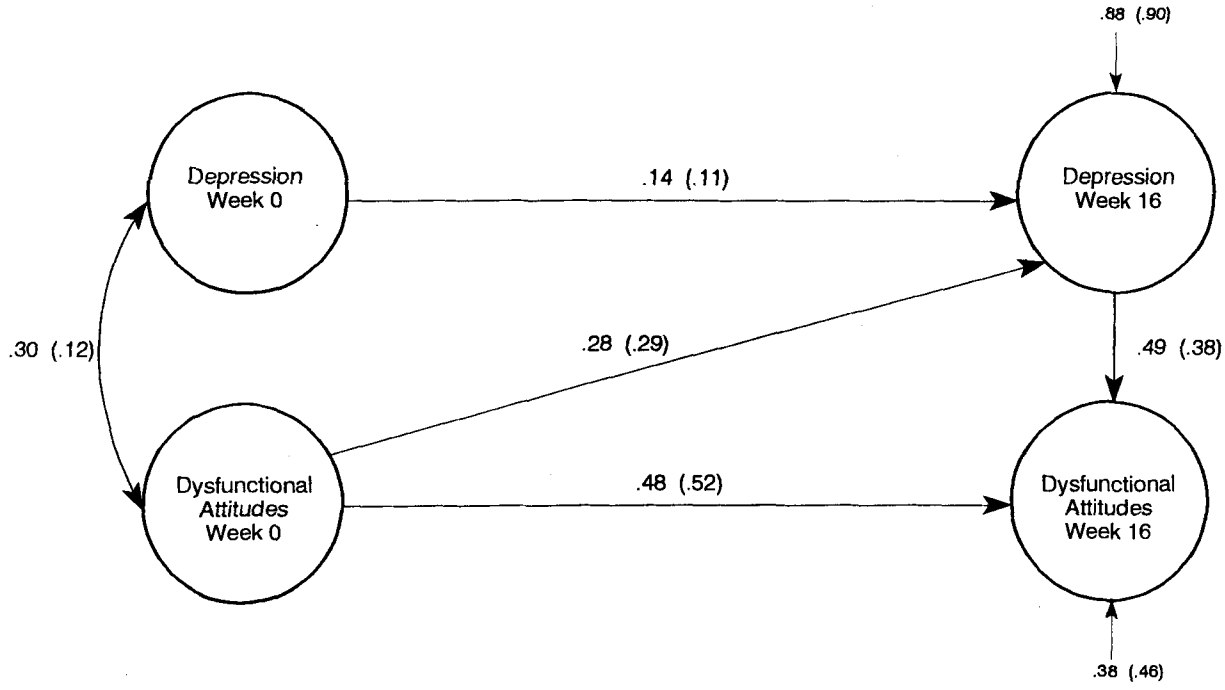

Figure 1. Standardized parameters for the structural model relating dysfunctional attitudes and self-report depression at Weeks 0 and 16. Parameters for the model using self-report measures of depression are printed first, followed, in parentheses, by parameters for the model using clinical-evaluator measures of depression. Residual arrows indicate the proportion of unexplained variance in the latent variables at 16 weeks. Both the state dependence and relative stability parameters were statistically significant.

sion at intake, when levels of depression are uniformly high, and larger correlations at termination and follow-up, when depression is generally low.

Relative Stability of Dysfunctional Attitudes

Relative stability of vulnerability markers is a robust phenomenon that has not received sufficient attention. Perfectionism, Need for Approval, and total DAS demonstrated moderate to high levels of relative stability during the treatment period (*rs* = .65, .56, and .65, respectively). The correlations are similar in size to those reported for sociotropy (r = .77) and autonomy (r = .72) over 16 weeks of cognitive–behavior therapy or drug treatment (Moore & Blackburn, 1996) and for dependency (r = .60) and self-criticism (r = .72) over 5 weeks of drug treatment (Mongrain & Zuroff, 1989b). Perfectionism, Need for Approval, and total DAS were characterized by even higher test–retest correlations over the follow-up period.

SEMs for the Treatment Period

Three positions concerning the relative importance of relative stability and state dependence were evaluated. The state–trait vulnerability model fit the data better than did the pure trait and pure state dependence models. The standardized parameters for the relative stability and state dependence paths were significant, moderately large, and approximately equal in magnitude. We conclude that dysfunctional attitudes (and the two subtypes of dysfunctional attitudes) remain viable candidates as predisposing variables. Prospective studies are needed to demonstrate their etiological role, but the present results rebut claims that they can be eliminated as possible contributors to vulnerability to depression.

The mechanism accounting for the state dependence effect remains to be clarified. Beck (1996) suggested that external stressors activate multidimensional modes and that disentangling the causal relations among the affective, motivational, behavioral, and physiological dimensions of modes may not be possible. According to this view, it is misleading to think of increases in depressed symptoms as causing increases in dysfunctional thinking; rather, depressed symptoms and dysfunctional attitudes rise and fall together because they are both aspects of fluctuating depressive modes.

On the other hand, Persons and Miranda (1992), Riskind and Rholes (1984), Segal and Ingram (1994), and Teasdale (1983) assigned a causal role to the affective symptoms of depression, arguing that negative mood increases the accessibility of negative cognitive structures. Unfortunately, no existing theory makes precise, quantitative predictions concerning the relation between mood and dysfunctional attitudes. Vulnerability researchers need to adopt theories from cognitive science that make explicit assumptions about the mental representation of cognition and affect and the processes that operate on those representations. They may then be able to derive more specific hypotheses about the timing, rate, and upper and lower bounds of the "activating" effect of mood on dysfunctional attitudes. Connectionist models seem especially promising (Caspar, Rothenfluh, & Segal, 1992).

Other aspects of the complex syndrome of depression could also play a role in activating dysfunctional attitudes. Alterations in central nervous system functioning might directly affect dysfunc-

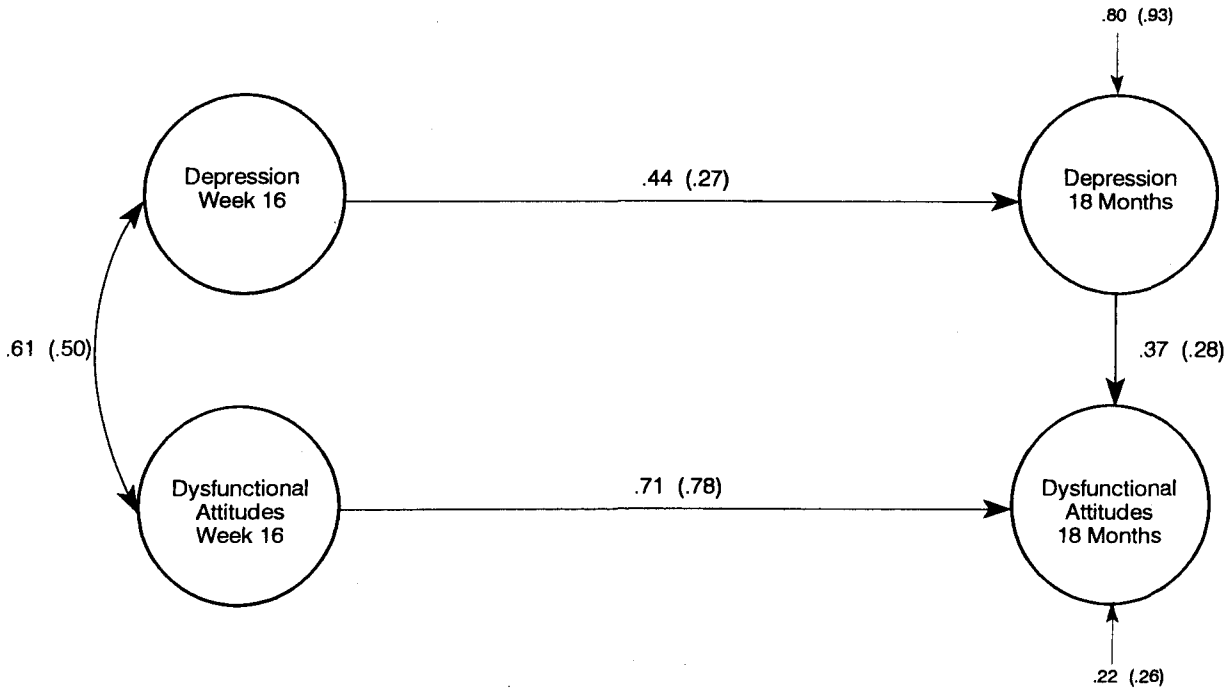

Figure 2. Standardized parameters for the structural model relating dysfunctional attitudes and self-report depression at Week 16 and at 18 months. Parameters for the model using self-report measures of depression are printed first, followed, in parentheses, by parameters for the model using clinical-evaluator measures of depression. Residual arrows indicate the proportion of unexplained variance in the latent variables at 18 months. Both the state dependence and relative stability parameters were statistically significant.

tional thinking. Teasdale and Barnard's (1993) interacting cognitive subsystems theory suggests that unpleasant somatic symptoms such as fatigue could affect depressed patients' "implicational coding," leading to activation of more negative schemas.

SEMs for the Follow-Up Period

Both depression and dysfunctional attitudes displayed greater relative stability during follow-up than during treatment. The relative stability of dysfunctional attitudes (standardized parameter of .71) was impressive considering that the patients were caught up in the aftermath of a major depression, surely a turbulent period in their lives, and that the follow-up period extended over 18 months. The stability of dysfunctional attitudes was comparable with that observed in longitudinal studies that have been cited as evidence of the long-term stability of adult personality (McCrae & Costa, 1990).

Nevertheless, state dependence effects were observed during the follow-up period. Mean levels of depression did not change during the follow-up period; rather, patients' scores fluctuated, with some patients displaying increases and some displaying decreases in depression. In these circumstances, state dependence would be expected to lead to fluctuations in dysfunctional attitudes. Some patients experienced intensification of their dysfunctional attitudes, whereas others experienced decreases in dysfunctional attitudes.

The activation of vulnerabilities during follow-up may contribute to relapse and recurrence of depression (Segal, Shaw, & Vella, 1989; Segal, Shaw, Vella, & Katz, 1992). Relatively small, clinically insignificant increases in depressed symptoms may increase the accessibility of dysfunctional attitudes, such as perfectionism and need for approval. If stressors persist, the patient's depression may intensify as events are increasingly interpreted on the basis of more readily accessible depressogenic cognitive structures.

Influence of Dysfunctional Attitudes on Treatment Outcome

We found that patients with high levels of dysfunctional attitudes at intake had more residual depression at the end of treatment. Peselow et al. (1990) also reported a negative effect of dysfunctional attitudes on outcome in pharmacologically treated patients. Previous analyses of the TDCRP data using nonlatent variable methods found that Perfectionism, but not Need for Approval, was a negative predictor of response to treatment (Blatt, Quinlan, Pilkonis, & Shea, 1995). Yet to be determined is how dysfunctional attitudes, perhaps especially perfectionism, interfere with the short-term treatment of depression. (See Blatt, Zuroff, Bondi, Sanislow, & Pilkonis, 1998, for a discussion of possible mechanisms.)

Methodological Issues

Three limitations of the results should be mentioned. First, we did not examine subgroups of depressed patients because subdividing the sample would have produced sample sizes too small for SEMs. It is possible that relative stability and state dependence would differ in importance depending on demographic variables,

diagnostic subgroups, family history, or social environmental variables.

Second, only self-report measures of dysfunctional attitudes were available. The relative stability of dysfunctional attitudes is somewhat overestimated because of shared method variance at the two points in time. It would have been desirable to have a more indirect measure of cognitive vulnerability (e.g., Segal, Gemar, Truchon, Guirguis, & Horowitz, 1995) or reports of perfectionism and approval seeking from another informant.

Third, there was substantial attrition in the TDCRP sample. Patients who dropped out of treatment or were removed from treatment may have differed from the completers in terms of the stability of their dysfunctional attitudes or their sensitivity to state.

An important methodological lesson to be learned from this study is that it is potentially misleading to focus exclusively on mean changes, as revealed in ANOVAS, or on relative stability, as revealed in correlational analyses. Both kinds of questions need to be addressed; either form of analysis by itself tells only half the story. SEMs offer the advantage of permitting a unified analysis of stability and state dependence effects, as well as yielding more accurate estimates of the magnitudes of the effects. At the same time, one must remember that even when SEMs demonstrate that a model fits the data, it is always possible that other models might fit the data as well or better.

Implications for Assessment of Dysfunctional Attitudes and Treatment of Depression

The state–trait vulnerability model was clearly superior to the pure trait and pure state dependence models. Dysfunctional attitudes are neither fixed and unchanging nor mere concomitants of the depressed state. The assessment of vulnerability to depression must take into account the fact that variance in DAS scores (and, we assume, other purported measures of vulnerability) includes both stable, trait-linked variance and fluctuating, state-linked variance. The presence of trait-linked variance implies that individual differences in trait vulnerability can be assessed in remitted depressives by using self-report measures.[7] However, the proportion of valid trait variance in such measures will be limited by the presence of state-linked variance. In sufficiently well-studied populations, it might be possible to statistically correct DAS scores for concurrent levels of depression to obtain a more valid estimate of trait vulnerability. The presence of state-linked variance also implies that investigators cannot assume that decreases in DAS scores indicate that patients' underlying schemas or modes have been modified. Treatment may have accomplished only the initial goal of deactivating problematic depressogenic structures.

Despite decreases in levels of depression, patients with initially high levels of dysfunctional attitudes remained relatively high in dysfunctional attitudes at termination and follow-up. We think that it is unlikely that these patients became free from vulnerability. Rather, the SEMs for the follow-up period suggest that patients who experienced an increase in depressed symptoms were also likely to have experienced an activation of dysfunctional attitudes. The activation of dysfunctional attitudes may have increased their risk for subsequent clinically significant depression (Segal et al., 1992). This possibility underscores the importance of providing treatments that address underlying cognitive and personality vulnerabilities as well as the overt symptoms of depression (Hayes, Castonguay, & Goldfried, 1996). A final implication is that clinical trials of different treatments need to compare their effectiveness in modifying underlying vulnerabilities as well as in reducing symptoms.

[7] The priming methodologies advocated by Segal and Ingram (1994) may be especially useful in mixed samples that include both highly vulnerable and less vulnerable individuals. Priming may increase differences in DAS scores between the subgroups by activating dysfunctional attitudes in the vulnerable individuals. Priming may be less useful with samples that are known to consist of vulnerable individuals, for example, remitted depressed individuals.

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