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A longitudinal investigation of information processing and cognitive organization in clinical depression: stability of schematic interconnectedness.

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Running head: STABILITY OF NEGATIVE SELF-STRUCTURES

Stability of Negative Self-Structures: A Longitudinal Comparison of Depressed, Remitted, and Nonpsychiatric Controls.

Abstract

To be considered a vulnerability marker for depression, a variable should, in addition to demonstrating sensitivity and specificity also show evidence of temporal stability (i.e., remain present in the absence of depressive symptomatology). Although many cognitive factors are associated with depression, the majority of them appear to be episode rather than vulnerability markers. This study examined cognitive organization of positive and negative interpersonal and achievement content in clinically depressed, remitted and nonpsychiatric controls. A sample of 54 clinically depressed individuals and 37 never-depressed controls completed self-report measures of positive and negative automatic thoughts and two cognitive organizational tasks at initial assessment. They were retested 6 months later when half of the depressed group no longer met diagnostic criteria for major depression. Negative automatic thoughts decreased and positive automatic thoughts increased significantly in individuals who had improved clinically. The organization of negative interpersonal content remained stable despite symptom amelioration, but negative achievement content was less interconnected at follow-up in those patients who had improved. The structure of relational schemas, in particular, appears to be stable and may be an important cognitive vulnerability factor for depression.

Keywords: Depression, Schema, Cognitive-Organization, Structure, Vulnerability; Remission

Stability of Negative Self-Structures: A Longitudinal Comparison of Depressed, Remitted, and Nonpsychiatric Controls.

Mental representation of self is an important construct in social (Baldwin, 1992; Baldwin, Granzberg, Pippus, & Pritchard, 2003; Campbell, Assanand, & DiPaula, 2003; Linville, 1987), cognitive (Bowers, 1981; Ingram & Kendall, 1986; Rogers, Kuiper, & Kirker, 1977; Williams, Watts, MacLeod, & Mathews, 1997), and clinical science (Clark, Beck, & Alford, 1999; Dobson & Kendall, 1993; Segal, 1988). A critical assumption underlying cognitive theories of depression, for instance, is that vulnerable individuals develop a negative or depressive schema that later influences how they respond to life circumstances. Schemas have been defined in numerous ways (Markus, 1977; Beck, Rush, Shaw, & Emery, 1979), but most definitions incorporate the idea that they consist of both structural (i.e., organizational) properties and propositional (i.e., content) elements (Ingram, Miranda, & Segal, 1998; Spielman & Bargh, 1990). Schmidt, Schmidt and Young (1999) referred to schemas as "the basic structural components of cognitive organization through which humans come to identify, interpret, categorize, and evaluate their experiences" (p. 129). Over the past few years, increased empirical attention has been paid to the examination of cognitive structures (Dozois & Dobson, 2001b; Rafaeli-Mor & Steinberg, 2002), although prior to this time the focus of depression research has been on self-reported cognition and information processing.

Studies that have assessed negative cognition through self-report questionnaires, attentional bias measures, or memory tasks generally support the descriptive hypotheses of cognitive theory of depression – that depression is associated with negative thinking – but a greater challenge has surrounded the identification of cognitive vulnerability factors. Indeed, the vast majority of studies has shown that negative thinking, clearly evident in a mood-disordered state, improves once depression subsides (e.g., Dobson & Shaw, 1987; Dohr, Rush, & Bernstein,

1989; Lewinsohn, Steinmetz, Larson, & Franklin, 1981; for reviews, see Barnett & Gotlib, 1988, and Haaga, Dyck, & Ernst, 1991; but see Alloy et al., 1999, 2006; Solomon, Haaga, Brody, Kirk & Friedman, 1998). These findings are inconsistent with the cognitive theory of depression. After all, if negative cognition is causally implicated in depression, it should at least be available, and ideally accessible, prior to the onset (or at least the recurrence) of this disorder. Studies that have utilized mood induction methodologies, and compared never-depressed controls to individuals in whom depression has remitted (e.g., Ingram, Bernet, & McLaughlin, 1994; Miranda & Persons, 1988; Teasdale & Dent, 1987), have, however, lent credence to the proposition that there may be stable cognitive vulnerability factors for depression. In these studies, individuals with previous depression often exhibit similar scores to never-depressed persons on measures of dysfunctional attitudes. When induced into a negative mood state, however, previously depressed individuals show an increase in negative thinking that is not demonstrated in never-depressed controls. Such cognitive reactivity studies suggest that negative cognitive structures are present but latent until activated by sad mood (see Lau, Segal, & Williams, 2004). Consequently, some researchers contend that these dormant cognitive structures may require activation by means of priming before differences on cognitive measures are found (Miranda, Gross, Persons, & Hahn, 1998). Another possibility is that more individualized assessment of cognitive content will reveal differences between previously depressed and never-depressed persons (Solomon, Arnow, Gotlib, & Wind, 2003).

Dozois and Dobson (2001a) suggested that stability of cognition may be found without mood challenge paradigms by assessing the interconnectedness of cognitive structures. Cognitive structure was operationalized in this study as the organization of adjective content and evaluated using two related cognitive organizational tasks. The first task was computerized and assessed the interconnectedness of positive and negative adjective content. This task is described

in greater detail in a subsequent section of this article as well as in other sources (e.g., Dozois & Frewen, 2006). Briefly, participants simultaneously make self-referent and valence decisions about each adjective (on the x- and y-axis, respectively) by indicating where on the grid task the adjective should be located in psychological space. Using Pythagorean theorem, the coordinate point from each adjective location is then used to compute the interstimulus distances among the adjectives separately for positive and negative content. The second measure was a card sorting task that provided an index of the redundancy of positive and negative adjectives across self-generated aspects or groupings of self.

These cognitive organizational tasks and two information processing tasks (i.e., the emotional Stroop task and the Self-Referent Encoding Task) were administered to a sample of individuals with major depressive disorder. Six months later, these participants were reevaluated using the same measures. At the follow-up assessment, half of the sample had remained depressed and the other half was remitted. The principal hypothesis of this study was that negative information processing would function as a concomitant of depression, evident during an episode but absent once depression improved. Negative cognitive organization, on the other hand, was expected to remain stable across time, irrespective of symptom amelioration. This hypothesis was supported. Although attentional and memory biases dissipated with clinical improvement, negative self-referent adjective content continued to be well-interconnected. Organization for positive content, in contrast, became increasingly interconnected on symptom remission. These findings suggest that negative self-structures associated with depression may be vulnerability factors for depression and its recurrence.

It is important to point out that this study only investigated the processing and organization of *interpersonal* content. There are several literatures, however, which suggest that other perhaps equally important self-aspects may be worth exploring as cognitive vulnerability

factors related to depression. Rather than viewing the self-schema as a monolithic concept in which cognition in depression is always stable and characteristically negative (see Cantor, Markus, Niedenthal, & Nurius, 1986; Dykman & Abramson, 1990; Dykman, Abramson, Alloy, & Hartlage, 1989; Halberstadt, Niedenthal, & Setterlund, 1996; Markus, 1990, and Safran, Segal, Hill, & Whiffen, 1990, for discussions surrounding the limitations of this conceptualization), a greater understanding of depression may be obtained if the self-system is viewed and tested as being composed of several different aspects (cf. Mongrain & Blackburn, 2005).

Negative core beliefs generally fall into two main categories: beliefs pertaining to unlovability (e.g., "I am unwanted", "I am bound to be rejected"), and beliefs related to themes of helplessness and incompetence (e.g., "I am a failure", "I am ineffective"; see J. Beck, 1995, p. 169; Clark et al., 1999; Dozois, Frewen, & Covin, 2006; Mongrain & Blackburn, 2005; Young, Klosko, & Weishaar, 2003). These broad themes have been the focus of various measures of cognition (e.g., the Dysfunctional Attitude Scale) and personality (e.g., the Sociotropy-Autonomy Scale) related to depression. Sociotropy/dependency and autonomy/self-criticism, for example, are believed to confer an increased risk of depression when congruency exists between one's personality and the type of life stressor experienced. The empirical literature, however, has demonstrated more consistent support for sociotropy than for autonomy in this regard (see Clark et al., 1999).

The purpose of this study was to examine both negative interpersonal and achievement adjective content and test the stability of cognitive organization in clinical depression. Cognitive organization for positive content was hypothesized to be less interconnected in the depressed and remitted depressed groups than nonpsychiatric controls. Conversely, greater organization of negative self-referent content was expected in the depressed and remitted depressed groups than in controls. Cognitive organization for negative content was predicted to be temporally stable in

all three groups (although conceptually this is most important in the sample of individuals in whom depression remits). Consistent with past research cited above, it was anticipated that the organization of positive content would improve as depression ameliorates.

Method

Participants

Female[1] volunteers were recruited through hospital referrals and newspaper advertisements. The original sample consisted of 54 individuals with clinical depression and 37 nonpsychiatric controls. The depressed sample met criteria of major depressive disorder, diagnosed according to the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I, Version 2.0; First, Gibbon, Spitzer, & Williams, 1996). Individuals with comorbid Axis I disorders were also invited to participate, provided that these other conditions were not part of the study exclusionary criteria. Nonpsychiatric controls were included if they did not meet current diagnostic criteria for any mental disorder and had no lifetime history of clinical depression or anxiety. The sample was required to be between the ages of 18 and 65 years and to have achieved a minimum of 8th grade education. Exclusion criteria for both groups consisted of diagnoses of bipolar disorder, substance abuse or dependence, and evidence of cognitive impairment or psychosis.

The average age of the 91 eligible participants was 42.59 (*SD* = 14.30) years. The mean level of education was 13.95 (*SD* = 1.90) years. The sample was predominantly Caucasian (i.e., 97%). Twenty-nine percent of participants were single, 45% married or cohabitating, 20% divorced or separated, and 6% widowed. Approximately 46% of the sample was employed outside of the home, 38% were unemployed, 8% worked in the home, and 8% were students.

Measures

Beck Depression Inventory-II (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) is the

most widely used index of self-reported depressive symptomatology. This instrument consists of 21 items, each of which are rated 0-3 in severity. Numerous studies have supported the psychometric properties of the BDI-II (see Dozois & Covin, 2004).

Beck Anxiety Inventory (BAI). The BAI (Beck, Epstein, Brown, & Steer, 1988) is a 21-item measure that assesses the severity of anxiety symptoms. Items are scored 0-3 in terms of their severity. The BAI exhibits excellent psychometric characteristics and is commonly used in research and practice (Roemer, 2001).

Automatic Thoughts Questionnaire - Negative (ATQ-N). The ATQ-N (Hollon & Kendall, 1980) is comprised of 30-items that assess the frequency of negative automatic thoughts. Each item is scored from 1 (*not at all*) to 5 (*all the time*), with higher scores reflective of more frequent negative thoughts. This instrument has excellent psychometric properties and differentiates between depressed and nondepressed groups.

Automatic Thoughts Questionnaire - Positive (ATQ-P). The ATQ-P (Ingram & Wisnicki, 1988) is a 30-item questionnaire that assesses the frequency of positive automatic thoughts. As with the ATQ-N, individual items range from 1 to 5. This instrument has strong psychometric properties (Burgess & Haaga, 1994; Ingram, Kendall, Siegle, & Guarino, 1995).

Adjectives for the Cognitive Tasks

The stimuli for the cognitive organizational tasks were comprised of 80 adjectives (20 interpersonal positive, 20 interpersonal negative, 20 achievement positive, 20 achievement negative). Adjectives were extracted from a list of approximately 300 adjectives (Myers, 1984) and were chosen based on their theoretical salience to the sociotropic and autonomous personality dimensions (see Beck, 1983). Ratings of both the emotional intensity of the adjective and its ability to evoke an image were acquired from Myers (1984). Word frequency (i.e., frequency of use in the English language per million words, derived from Carroll, Davies, &

Richman, 1971) and word length data were also used to ensure that the resultant word lists were comparable on these dimensions. The final adjective sets were statistically equivalent on emotional intensity, F (3, 74) = 1.07, p = *ns*, imaginability, F (3, 76) = 1.66, p = *ns*, word frequency, F (3, 76) = 0.79, p = *ns*, and word length F (3, 76) = 1.29, p = *ns*. Examples of stimuli that were interpersonal in content include *admired, comforted, encouraged, alone, rejected,* and *unwanted.* Illustrative achievement-related stimuli are *capable, respected, successful, defeated*, *deficient*, and *incompetent*. Five Ph.D. clinical psychology students rated each adjective in terms of whether it represented more of an interpersonal- or an achievement-related adjective. There was excellent interrater reliability between these ratings and the intended content domains (94% agreement; 6 = .87).

Cognitive Organizational Tasks

Psychological Distance Scaling Task (PDST). The PDST (Dozois, 2002; Dozois & Dobson, 2001a, 2001b, 2003; Dozois & Frewen, 2006) was used to assess cognitive organization. A square grid (16 x 16 cm^2) was presented to participants on the computer monitor. In the middle of this grid was a horizontal line, anchored with the statement *not at all like me* on the left and *very much like me* on the right. A vertical line was also shown in the middle of the grid with the anchors *very positive* at the top and *very negative* at the bottom. Individual adjectives were presented randomly in the center of the grid and respondents were instructed to move the mouse to the position on the screen that best characterized the word's degree of self-relevance and degree of valence. After each response, participants confirmed the position of the adjective before proceeding to the next rating. There were 10 practice trials and 80 experimental trials. The x/y coordinate point for each adjective was recorded by the computer to calculate the average interstimulus distances. The horizontal and vertical pixel lengths were standardized by the computer.

The assumption underlying the PDST is that the way individuals organize adjective content is reflective of the degree of schema consolidation or interconnectedness of self-relevant information (see Bower, 1981; Dance & Kuiper, 1987; Ingram et al., 1998). Greater distance among adjectives is believed to indicate less interconnectedness or consolidation of information, whereas less distance is thought to reflect greater interconnectedness or consolidation. The reliability and validity of this measure have been supported in previous studies (Dozois, 2002; Dozois & Dobson, 2001b, 2003; Dozois & Frewen, 2006).

The computation of interstimulus distance involves taking the mean squared distances of every adjective-adjective combination within a particular adjective list (e.g., interpersonal positive), dividing by the total number of possible distances, and obtaining the square root of this number. As in previous research using this measure, interstimulus distances were assessed idiographically to examine the organization of the self-schematic content (cf. Solomon et al., 2003). This approach was taken for two primary reasons. First, interstimulus distances were intended to represent the organizational aspects of an individual's self-schema. Second, the nature of the task made it possible that highly nonself-descriptive adjectives could be more tightly connected because they were not relevant to the individual.

Attribute Redundancy Card-Sorting Task. A card-sorting task was used to evaluate the extent to which similar positive and negative adjectives permeated participants' facets of self. This task was adapted from Linville's (1987) self-complexity measure and involved sorting 80 adjectives into groups that clustered together to describe an individual's core aspects of self. Attribute redundancy was defined as the number of similar trait adjectives evident across different facets of self (e.g., as a friend, colleague, mother, spouse, etc.). Participants generated their own superordinate categories according to what that they deemed to be most important to their self-definition. Participants then sorted the adjectives into piles within these self-generated

groupings. Adjectives were permitted to be reused in as many superordinate categories as participants believed they applied; adjectives were excluded if participants thought that they were not relevant to their fundamental self-aspects. Four different attribute redundancy scores were calculated: interpersonal positive, interpersonal negative, achievement positive, achievement negative. Each score was an aggregate of the number of times each adjective was represented across one's self-aspects, controlling for the number of self-aspects in a given card sort, and the number of adjectives used:

$$\text{Attribute Redundancy} = \frac{1}{n_{dw} \times n_{dg}} \sum_{i = 1\text{-}30} n_{ri},$$

where n_{dw} = the number of distinct positive or negative words used in an individual=s card sort, n_{dg} = the number of groups (i.e., self-aspects) generated, and n_{ri} = the index of redundancy for each positive or negative adjective.[2]

Procedure

To increase the probability that potential participants would be eligible for the study, they were initially screened over the telephone using questions from the SCID-I (First et al., 1996) mood disorders module. If it was likely that a given participant would be suitable, an appointment was booked to administer the full SCID-I and to complete the questionnaires and cognitive tasks. Participants also completed the Shipley Vocabulary test (Shipley, 1940) to ensure that their verbal abilities were sufficient to complete the questionnaires and the cognitive-organizational tasks. Approximately 6 months (M = 5.91; SD = .78) after the original assessment, participants were readministered the SCID-I, the cognitive- and symptom-based questionnaires, and the cognitive tasks. The order of the two cognitive tasks was counterbalanced both at initial assessment and at follow-up. Sixty-six participants (61% from the depressed group, 89% from the control group) completed the follow-up assessment[3]. Seventeen participants from the

original depressed group continued to meet diagnostic criteria for current major depressive disorder (MDD); these individuals are herein labelled the stable depression group. There were 16 participants whose depression had remitted diagnostically according to the SCID-I (subsequently named the remitted depression group).[4] To help cover expenses (e.g., childcare, parking), participants were reimbursed $20.00 for each of the two sessions that they attended.

Results

Preliminary Analyses

Interrater Reliability

Four Ph.D. clinical psychology students, trained in the use of the SCID-I, served as diagnosticians for this study. All SCID-I interviews were audiotaped so that interobserver reliability could be established. A random sample of audiotapes was selected from the initial and follow-up assessments (20% in each case) and were reviewed by a second rater who was blind to the diagnostic status of participants. Diagnoses were treated as binary categories (absent or present) and interrater reliability was computed using the kappa coefficient (Cohen, 1960), which corrects for chance agreements. Interrater reliability was perfect (6 = 1.00) for initial group status (i.e., whether participants fell into the depressed or nonpsychiatric control groups). A kappa coefficient of 1.00 was also obtained for determining whether originally depressed participants continued to meet diagnostic criteria for MDD or had remitted. Interrater reliability was also excellent for individual diagnoses (interrater agreement = 95%; 6 = .84).

Sample Composition

Demographic information is shown in Table 1. No significant differences were found across groups on age, education, marital status, number of children, or employment status. Individuals in the remitted depressed group did score slightly but significantly lower on the vocabulary test than did those in the stable depressed and nonpsychiatric control groups.

Vocabulary scores were not, however, associated with performance on any of the cognitive tasks.

The stable and remitted depressed groups were also compared on patient-related features. As shown in Table 2, there were no statistically significant group differences on the age at which participants identified themselves as first experiencing a clinical episode of depression or the number of past depressive episodes. The groups were also similar in terms of overall Axis I comorbidity. The specific comorbid disorders represented in this sample as a whole were dysthymia (24%), social anxiety disorder (27%), post-traumatic stress disorder (27%), generalized anxiety disorder (27%), panic disorder (15%), obsessive-compulsive disorder (9%), specific phobia (3%), and bulimia (3%). The patient groups also did not differ from each other with respect to the treatments that they were receiving. The primary psychotherapeutic modality provided was supportive (21%), followed by psychodynamic (15%), and cognitive-behavioral (9%). Stable depressed and remitted groups were also receiving similar pharmacotherapy interventions with the predominant antidepressant being selective serotonin reuptake inhibitors (53%) and the main anxiolytic being benzodiazepines (37%). No significant differences emerged when individual types of treatment were examined. To ensure that systematic differences between the stable depressed and remitted depressed groups did not confound the results of this study, the main experimental hypotheses were also tested using a series of covariate analyses (i.e., controlling for differences in the frequency of suicide attempts, exposure to ECT, comorbid Axis I conditions, comorbid anxiety disorders, etc). The findings were same regardless of whether the covariates were included or excluded from the analyses.

Table 3 presents the symptom-severity scores for each group at initial assessment and at follow-up. At Time 1, there were significant group differences on both the BDI-II, F (2, 62) = 213.94, $p < .001$, and BAI, F (2, 62) = 57.02, $p < .001$. Individuals in the stable and remitted depressed groups did not differ statistically on BDI-II scores, but both groups, not surprisingly,

had markedly higher scores than nonpsychiatric controls. The stable depressed group also had a higher mean BAI score at Time 1 than did the remitted group who, in turn, had higher scores than controls. At follow-up, group differences were found on the BDI-II, F (2, 59) = 84.86, p < .001. As expected, post-hoc comparisons indicated that the stable depressed group scored higher than the remitted group who scored higher than controls. The same result occurred for BAI scores at Time 2, F (2, 59) = 46.07, p < .001.

Tests of Cognitive Change and Stability

Automatic Thoughts

The scores on the positive and negative automatic thoughts questionnaires are presented in Table 4. A 3 Group (stable depressed, remitted depressed, nonpsychiatric controls) x 2 Time (time 1 vs. time 2) mixed analysis of variance (ANOVA) was performed using scores on the ATQ-N as the dependent variable. There was a significant main effect of Time, F(1, 58) = 74.08, p < .001, which was qualified by a significant two-way interaction, F(2, 58) = 25.05, p < .001. Analyses of simple effects revealed statistically significant group differences at both Time 1, F(2, 62) = 120.37, p < .001, and Time 2, F(2, 59) = 43.20, p < .001. The patient groups scored higher on the ATQ-N than nonpsychiatric controls at both time periods. The stable depressed and remitted depressed groups did not differ significantly from one another at initial assessment but the latter group showed lower ATQ-N scores at Time 2. Analyses of within-subject changes indicated that scores improved significantly for both patient groups and were uniform across time for controls.

Examination of the ATQ-P scores revealed similar results. Again, the Group x Time interaction was significant, F(2, 58) = 5.22, p < .01. Significant group differences were found at both assessment periods (Time 1: F[2, 62] = 68.85, p < .001; Time 2: F[2, 59] = 29.43, p < .001). Individuals in the stable and remitted depressed groups scored significantly lower than controls

at both assessment periods. Scores for the depressed groups did not differ at Time 1, but the remitted group showed significantly higher ATQ-P scores at follow-up. Follow-up analyses, examining each group separately, indicated that scores did not change in the stable depressed group or nonpsychiatric controls. A significant increase in scores was apparent, however, in the remitted group.

Given that the remitted sample differed statistically from controls on both the ATQ-N and ATQ-P, a test of clinical equivalence was conducted to determine whether the remitted group's scores nonetheless fell within the normative range on these measures. For this comparison, normative data were derived from Dozois, Covin and Brinker (2003) and a previously established protocol was used to evaluate clinical equivalence (i.e., Kendall, Marrs-Garcia, Nath, & Sheldrick, 1999). The scores for the remitted group ($M_{ATQ\text{-}N}$ = 69.00, *SD* = 25.23; $M_{ATQ\text{-}P}$ = 83.67, *SD* = 21.68) were clinically equivalent to the norms for nondepressed samples ($M_{ATQ\text{-}N}$ = 52.91; *SD* = 18.18; $M_{ATQ\text{-}P}$ = 98.61, *SD* = 13.02).

Cognitive Organization

The means and standard deviations of scores on the distance task (the PDST) and attribute redundancy task are shown in Table 5. These data were analyzed for interpersonal and achievement-related adjectives separately.

Interpersonal Stimuli. Interstimulus distances among self-referent adjectives were analyzed using a 3 Group (stable depressed, remitted depressed, nonpsychiatric controls) x 2 Time (time 1, time 2) x 2 Valence (positive, negative) split-plot ANOVA. The PDST distances among interpersonal adjectives served as the dependent variable. There was a statistically significant main effect of Valence, $F(1, 43) = 84.83$, $p < .001$, indicating that there was greater distance overall for negative than positive content. This main effect was qualified by a Group x Valence interaction, $F(2, 43) = 13.06$, $p < .001$, and a significant Group x Valence x Time

interaction, $F(2, 43) = 3.27$, $p < .05$.

Tests of simple effects, analyzing Time 1 scores, revealed a significant Group x Valence interaction, $F(2, 52) = 17.76$, $p < .001$. Group differences were evident for both positive, $F(2, 62) = 11.46$, $p < .001$, and negative, $F(2, 53) = 10.66$, $p < .001$, content. No significant differences were found between the stable and remitted depressed groups but each group showed significantly less interstimulus distance for negative content and greater distance for positive content than controls. Inspection of Time 2 data yielded a parallel pattern of results. There was a significant main effect of Valence that was qualified by a Group x Valence interaction, $F(2, 46) = 12.57$, $p < .001$. Oneway ANOVAs were significant for both positive, $F(2, 63) = 15.96$, $p < .001$ and negative, $F(2, 46) = 5.79$, $p < .01$, content. Both the stable and remitted depressed groups showed greater distances for positive content, and less distance for negative content, than the nonpsychiatric controls. The stable and remitted depressed groups did not differ statistically from one another for either content set. As predicted, paired samples t-tests revealed no significant within-subjects differences from Time 1 to Time 2 for the stable depressed, remitted depressed or nonpsychiatric control groups.

When attribute redundancy for interpersonal content was assessed, the Group x Valence x Time interaction was not significant. Instead, there was a significant main effect of Valence and three significant two-way interactions (Group x Time, $F[2, 63] = 7.42$, $p < .001$; Group x Valence, $F[2, 63] = 5.82$, $p < .001$; Valence x Time, $F[2, 63] = 1.06$, $p < .001$). All groups showed greater redundancy for positive than for negative content, but the depressed and remitted groups exhibited more negative and less positive redundancy than controls. In addition, there was a significant shift in positive redundancy across time but no significant change in negative redundancy.

Given that one of the main hypotheses pertained to the stability of negative cognitive

structure, time 2 redundancy scores were also compared across groups. There were no significant differences among the groups on positive redundancy. The depressed and remitted groups, who did not differ from each other at Time 2, both showed significantly greater redundancy for negative stimuli than controls. Within-subject comparisons revealed only one significant finding – an improvement in the remitted depressed group in interpersonal positive content across time.

Achievement Stimuli. In contrast to the stability of organization found across tasks for negative interpersonal adjectives, the analyses of achievement stimuli yielded more variable findings. In this instance, a mixed ANOVA on PDST data revealed a significant Group x Valence x Time interaction, $F(2, 34) = 6.58$, $p < .001$. At Time 1, there was a significant main effect of Valence and a significant Group x Valence interaction, $F(2, 46) = 55.27$, $p < .001$. For both positive, $F(2, 60) = 21.79$, $p < .001$, and negative, $F(2, 49) = 69.38$, $p < .001$, content the depressed and remitted groups performed similarly but differed significantly from controls. Congruous findings were obtained at Time 2, where the two-way interaction was statistically significant, $F(2, 38) = 17.77$, $p < .001$. For positive content, the depressed and remitted groups did not differ from one another but showed greater interstimulus distance than controls. For negative content, however, there were significant pairwise contrasts between each of the groups (i.e., depressed < remitted < controls). No significant within-subjects changes occurred in the stable depressed group or nonpsychiatric controls. The remitted sample, though, showed significantly greater distance of negative achievement content at Time 2 than at Time 1, $t(11) = 3.43$, $p < .01$. This group also showed a marginally significant trend toward less positive interstimulus distance over time, $t(15) = -2.01$, $p = .06$.

When attribute redundancy was assessed for achievement content, there was a significant main effect of Valence, $F(1, 62) = 27.86$, $p < .001$, and a significant Group x Valence

interaction, $F(2, 62) = 16.26$, $p < .001$. One-way ANOVAs, used to follow up this interaction, were significant for negative content only, $F(2, 63) = 15.14$, $p < .001$. The depressed and remitted groups did not differ significantly from one another but both groups showed greater negative redundancy overall than controls.

Discussion

A main objective of this study was to investigate cognitive organization of interpersonal and achievement content in depressed, remitted and nonpsychiatric controls. This study represents an important replication and extension of the findings from Dozois and Dobson (2001a). In this previous study, cognitive organization was assessed for interpersonal content only yet, as highlighted earlier in this article, the self-system may be comprised of multiple aspects of self some of which may be more (or less) influential and stable in depression. Thus, in addition to using an interpersonal set of adjectives, the self-organization of achievement-related content was also investigated in this study. Although the previous findings were certainly supportive of the idea that negative cognitive organization is stable in depression, Dozois and Dobson (2001a) did not include a nonpsychiatric control group, which was another limitation that was rectified in the present experimental design.

Three main conclusions can be drawn from the current study. First, positive and negative automatic thoughts appear to change significantly, and in expected directions, over time as individuals with depression improve. Second, the organization of negative interpersonal content may be stable irrespective of whether clinical depression improves or endures. Third, it may not be the case that negative cognitive structures are stable for all content domains related to self, as the organization of achievement content shifted with remission. These findings are each discussed in turn and situated within the context of the extant empirical literature. The implications of these results are also highlighted and directions for future research addressed.

A finding consistent throughout the literature is that negative thinking in depression tends to recover along with one's mood state (see Clark et al., 1999, for review). In this study, positive and negative automatic thoughts improved significantly as individuals moved from clinical depression into remission. Ingram et al. (1998) defined cognitive products as by-products of the operation of information processing and schematic properties, the latter of which consist of both structure and content. These results correspond with past research and suggest that the cognitive products assessed (in the absence of priming methodologies) operate more as a state than as vulnerability markers for depression (cf. Barnett & Gotlib, 1988).

Although the measures of cognitive products[5] appeared to deactivate when individuals remitted, negative structure continued to be stable for interpersonal content across the two tasks that assessed cognitive organization. Insufficient statistical power represents one possible explanation for the failure to find significant differences in the organization of negative interpersonal content in the remitted group across time. To test this possibility, data from two previous studies (Dozois & Dobson, 2001b; Dozois & Frewen, 2006) were used. The relevant comparison here involves the effect sizes between depressed and nonpsychiatric controls on negative interpersonal content. Based on these data, and incorporating the correlation between indices at time 1 and time 2, the estimated power with the current sample was .99 with alpha set at .05. In fact, one would need only a sample of about 6 participants to obtain sufficient statistical power. Thus, the difference in negative interpersonal organization appears (by statistical induction) to be probabilistically negligible across time in the remitted sample (see Cohen, 1988, pp. 16-17).

These findings support one of the central tenets of Beck's (Beck et al., 1979; Clark et al., 1999) cognitive theory of depression that negative self-schemas may be present but latent and that, once activated (often by personality relevant stressors) they may proceed to impact the

encoding, memory, attentional, and interpretational biases that are so often associated with depressed mood. Organization for positive interpersonal content, in contrast, was less stable. Positive content remained less interconnected in the patient groups relative to controls at both initial and follow-up assessments for the distance task. Greater positive redundancy scores were found, however, at Time 2 than at Time 1 for the remitted sample.

Interestingly, cognitive organization appeared to shift for negative achievement content. For achievement content, the stable depressed and remitted groups, who did not differ significantly, evidenced less interstimulus distance (i.e., greater interconnectedness) of negative adjectives and greater distance for positive adjectives at Time 1 than controls. Although the same finding was obtained for positive content at Time 2, the remitted sample showed less interconnectedness of negative achievement content across time. Whereas no significant attribute redundancy differences were found for positive achievement content at either assessment period, the depressed groups exhibited greater redundancy of negative content than controls.

Together, these findings indicate that interpersonal schemas may be especially important in cognitive vulnerability to depression. Many studies, in fact, concur, highlighting the powerful nature of interpersonal interactions in depression and its treatment (e.g., Hammen, 1991; Hayes, Castonguay, & Goldfried, 1996; Joiner, 2000; Joiner & Coyne, 1999). The sociotropy and autonomy literature, for example, frequently yields significant interactions of personality and relevant negative life events in the prediction of depression for the former but less consistently for the latter: "[N]egative life events in the interpersonal domain [are] simply more likely to elicit depressive reactions than [are] equally negative but noninterpersonal events" (Hammen, 1999, p. 27).

What is interesting about these findings, however, it that they suggest that self-knowledge

organized around interpersonal themes may be especially salient in depression (also see Schmidt et al., 1999). This idea that relational schemas are pivotal to the depressive experience is not new. Internal working models (aka. schemas) of attachment relationships have, for instance, been cited as important distal variables related to the etiology of depression (Bowlby, 1988; Haaga et al., 2002; Hammen, 1999; Ingram et al., 1998). There are many possible factors that could contribute to stable and well-interconnected organization for negative interpersonal content, including internal working models developed through child-parent interactions, early trauma, contingent self-worth, family conflict, parental psychopathology, peer relations, and early episodes of depression (Joiner & Coyne, 1999). Further research is needed to examine how negative interpersonal structures develop and become increasingly consolidated over time.

It is important to emphasize though that the direction of causality may be reversed. That is, an episode of depression may result in a cognitive 'scar' (Lewinsohn et al., 1981) that contributes to the interconnectedness of interpersonal self-schemas (Hammen, 1991; Hammen & Rudolph, 2003; Joiner, 2000). In fact, it is also possible that both processes may be occurring. Although this study involved a test of the cognitive organization of interpersonal- and achievement-related content, it is important to point out that cognition (and cognition about interpersonal content) does not operate in a vacuum that is devoid of the interpersonal context in which it is developed and altered (Joiner & Coyne, 1999). Interpersonal schemas are likely developed through many means that interact dynamically over the course of the lifespan.

Segal (1988) cited three main theories regarding the differences between depressed and nondepressed persons: 1) that there are differences in the interconnectedness of self-elements, whereby individuals are vulnerable to depression because of the activation of a negative self-structure; 2) that there are differences in the accessibility of self-elements whereby dysphoria increases and maintains the accessibility of negative self-aspects, and; 3) there are differences in

the availability of stored content, whereby depressives have more negative constructs available about the self. The results of this study add to past research, which has shown that the differences between depressed and nondepressed individuals may be related to functional features (i.e., related to accessibility, or availability) of the schema by showing that there may be differences in structural (i.e., interconnectedness) properties as well. Moreover, this interconnectedness appears to be present both in and out of episode and may, therefore, be causally related to the onset and/or recurrence of this debilitating syndrome. Negative cognitive organization may also relate to the notion of "cognitive reactivity" (Lau et al., 2004).

It is not clear from this study why the organization of self-referent information about achievement material was not stable. It is possible that such information is less relevant to self or that it is not as pertinent to depression as is interpersonal content. Another explanation is that this study assessed cognitive organization using a female sample. Males and females may differ in the emphasis that they place on interpersonal versus achievement strivings and how such situations interact with emotional experiences (Kirsh & Kuiper, 2002; Woike, 1994). It is conceivable that more stable organization for achievement content would have been found had males also been included in this sample. Thus, it is not possible to generalize these findings to males. Research is needed to determine the extent to which gender differences exist in cognitive organization and how these relate to depressive severity. Individual differences in the organization and stability of adjective content may also depend on one's self-definition and the extent to which one focuses on interpersonal or achievement goals. Thus, studying the relationship of cognitive organization and personality modes (e.g., sociotropy and autonomy) is another interesting direction for future research.

Another limitation of this study is that, although participants in the remitted sample were no longer clinically depressed according to structured diagnostic interviews, they were not

necessarily "recovered" as defined by Frank et al. (1991). In fact, the average BDI-II score for individuals in this group was 15.56 (*SD* = 8.37). This score falls in the low end of the mild range according to the test manual (Beck et al., 1996); nonetheless it is high enough to suggest that the residual symptomatology of some participants may have influenced the findings of stable negative cognitive organization. When remitted participants with clinically elevated residual symptoms (as assessed via SCID-I follow-up scores) were excluded from the analyses, however, identical results were obtained. These findings notwithstanding, a more definitive test of the stability of cognitive organization may have involved reassessing the remitted sample at different time intervals to ensure that participants had met criteria for recovery (Frank et al., 1991) rather than simply remission. The changes in scores on the ATQ-N and ATQ-P, which were clinically equivalent to normative scores (Dozois et al., 2003), also supports the idea that negative cognitive structure is stable for interpersonal content. In addition, the finding of stable cognitive organization for negative interpersonal content has also now been replicated across two independent studies, using two cognitive organizational tasks and two distinct sets of adjectives. Thus, although not conclusive, it appears as though something is uniquely different about cognitive structures that pertain to relational schemas.

Future research is necessary to replicate these findings in a recovered sample. Another fruitful avenue for further research involves examining the development of negative relational schemas and testing how the organization of these schemas is related to the onset, maintenance, relapse and/or recurrence of depression. The organization of self-referent content could, for example, be examined in cognitively vulnerable groups (Alloy et al., 2000) or in other high-risk groups (e.g., children or adolescents of depressed parents; cf. Taylor & Ingram, 1999). Investigation of the utility of cognitive organization in predicting depressive relapse is also warranted. Individuals with a history of repeated episodes of depression have, for example, been

found to organize self-relevant content differently than equally depressed individuals with fewer past episodes (Dozois & Dobson, 2003). Given the high rates of comorbidity between depression and anxiety, it is possible that the stability of negative interpersonal structures would also be found in individuals with anxiety conditions. Studying cognitive organization in other areas of psychopathology would, therefore, be important.

Finally, it is possible that various psychological or pharmacological interventions differentially impact cognitive structures. Although the findings from this study suggest that negative interpersonal content is structured in a stable manner, it is conceivable that cognitive therapy (CT) would alter the interconnectedness of such schemas (cf. Segal et al., 2006).[6] In addition to its efficacy for the acute treatment of depression, CT appears to yield a prophylaxis against relapse (e.g., Hollon, Thase, & Markowitz, 2002). In fact, numerous studies have now shown that CT yields approximately half the relapse rates that are evident with antidepressant medication, an effect that is at least as powerful as maintaining patients on continuance medication (see Hollon et al., 2002). Moreover, CT appears to impact different brain structures than pharmacological intervention (see Goldapple et al., 2004).

Although this study assessed more than one content type, there are probably many other aspects of self and self-schemas that are important to assess in addition to the structure of interpersonal and achievement content. There may also be certain subtypes of interpersonal or achievement content that are important to investigate in depression and will no doubt enrich our understanding of this disorder (cf. Bieling, Beck, & Brown, 2000).

It is quite likely that the factors that contribute to the initial onset of depression are different from those that are related to future occurrences. It cannot be assumed on the basis of these findings that cognitive organization is causally related to depression. Indeed the reverse might also be true. Future research is needed, therefore, to test cognitive organization prior to

the onset of depression in order to fully assess its causal status. Notwithstanding the numerous exciting directions for future research, the findings from this study suggest that interpersonal schemas may play a particularly important and stable role in vulnerability to depression.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders DSM-IV-TR (text revision)*. Washington, DC: Author.

Alloy, L. B., Abramson, L. Y., Hogan, M. E., Whitehouse, W. G., Rose, D. T., Robinson, M. S., Kim, R. S., & Lapkin, J. B. (2000). The Temple-Wisconsin Cognitive Vulnerability to Depression Project: Lifetime history of Axis I psychopathology in individuals at high and low cognitive risk for depression. *Journal of Abnormal Psychology, 109,* 403_418.

Alloy, L. B., Abramson, L. Y., Whitehouse, W. G., Hogan, M. E., Panzarella, C., & Rose, D. T. (2006). Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. *Journal of Abnormal Psychology, 115,* 145-156.

Alloy, L. B., Abramson, L. Y., Whitehouse, W. G., Hogan, M. E., Tashman, N. A., Steinburg, D. L., Rose, D. T., & Donovan, P. (1999). Depressogenic cognitive styles: Predictive validity, information processing and personality characteristics, and developmental origins. *Behaviour Research and Therapy, 37,* 503-531.

Baldwin, M. W. (1992). Relational schemas and the processing of social information. *Psychological Bulletin, 112,* 461-484.

Baldwin, M. W., Granzberg, A., Pippus, L., & Pritchard, E. T. (2003). Cued activation of relational schemas: Self-evaluation and gender effects. *Canadian Journal of Behavioural Science, 35,* 153-163.

Barnett, P. A., & Gotlib, I. H. (1988). Psychosocial functioning and depression: Distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin, 104,* 97-126.

Beck, A. T. (1983). Cognitive therapy of depression: New perspectives. In P. J. Clayton & J. E. Barrett (Eds.), *Treatment of depression: Old controversies and new approaches* (pp. 265-290). New York: Raven.

Beck. A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56,* 893-897.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression.* New York: Guilford Press.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory Manual* (2nd. ed.). San Antonio, TX: Psychological Corporation.

Beck, J. S. (1995). *Cognitive therapy: Basics and beyond.* New York: Guilford.

Bieling, P. J., Beck, A. T., & Brown, G. K. (2000). The Sociotropy-Autonomy Scale: Structure and implications. *Cognitive Therapy & Research 24,* 763-780.

Bowlby, J. (1988). *A secure base: parent-child attachment and healthy human development.* New York: Basic Books.

Bower, G. H. (1981). Mood and Memory. *American Psychologist, 36,* 129-148.

Campbell, J. D., Assanand, S., & DiPaula, A. (2003). The structure of the self-concept and its relation to psychological adjustment. *Journal of Personality, 71,* 115-140.

Cantor, N., Markus, H., Niedenthal, P., & Nurius, P. (1986). On motivation and the self-concept. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (pp. 96-121). New York: Guilford Press.

Carroll, J. B., Davies, P., & Richman, B. (1971). *The American heritage word frequency book.* Boston: Houghton-Mifflin.

Clark, D. A., Beck, A. T., & Alford, B. A. (1999). *Scientific foundations of cognitive theory and therapy of depression*. Philadelphia: Wiley.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20,* 37-46.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Dance, K. A., & Kuiper, N. A. (1987). Self-schemata, social roles, and a self-worth contingency model of depression. *Motivation and Emotion, 11,* 251-268.

Dobson, K. S., & Kendall, P. C. (Eds.). (1993). *Psychopathology and cognition*. San Diego, CA: Academic Press.

Dobson, K. S., & Shaw, B. F. (1987). Specificity and stability of self-referent encoding in clinical depression. *Journal of Abnormal Psychology, 96,* 34-40.

Dohr, K. B., Rush, A. J., & Bernstein, I. H. (1989). Cognitive biases and depression. *Journal of Abnormal Psychology, 98,* 263-267.

Dozois, D. J. A. (2002). Cognitive organization of self-schematic content in nondysphoric, mildly dysphoric, and moderately-severely dysphoric individuals. *Cognitive Therapy and Research, 26,* 417-429.

Dozois, D. J. A. & Covin, R. (2004). The Beck Depression Inventory-II (BDI-II), Beck Hopelessness Scale (BHS), and Beck Scale for Suicide Ideation (BSS). In M. Hersen (Series Ed.), D. L. Segal & M. Hilsenroth (Vol Eds.), *Comprehensive handbook of psychological assessment: Volume 2. Personality assessment and psychopathology* (pp. 50-69). New York: Wiley.

Dozois, D. J. A., Covin, R., & Brinker, J. K. (2003). Normative data on cognitive measures of depression. *Journal of Consulting and Clinical Psychology, 71,* 71-80.

Dozois, D. J. A., & Dobson, K. S. (2001a). A longitudinal investigation of information processing and cognitive organization in clinical depression: Stability of schematic interconnectedness. *Journal of Consulting and Clinical Psychology, 69,* 914-925.

Dozois, D. J. A., & Dobson, K. S. (2001b). Information processing and cognitive organization in

unipolar depression: Specificity and comorbidity issues. *Journal of Abnormal Psychology, 110,* 236-246.

Dozois, D. J. A., & Dobson, K. S. (2003). The structure of the self-schema in clinical depression: Differences related to episode recurrence. *Cognition and Emotion, 17,* 933-941.

Dozois, D. J. A., & Frewen, P. A. (2006). Specificity of cognitive structure in depression and social phobia: A comparison of interpersonal and achievement content. *Journal of Affective Disorders, 90,* 101-109.

Dozois, D. J. A., Frewen, P. A., & Covin, R. (2006). Cognitive theories. In M. Hersen & J. C. Thomas (Series Eds.), J. C. Thomas & D. L. Segal (Vol Eds.), *Comprehensive handbook of personality and psychopathology: Volume 1. Personality and everyday functioning* (pp. 173-191). New York: Wiley.

Dykman, B. M., & Abramson, L. Y. (1990). Contributions of basic research to the cognitive theories of depression. *Personality and Social Psychology Bulletin, 16,* 42-57.

Dykman, B. M., Abramson, L. Y., Alloy, L. B., & Hartlage, S. (1989). Processing of ambiguous and unambiguous feedback by depressed and nondepressed college students: Schematic biases and their implications for depressive realism. *Journal of Personality and Social Psychology, 56,* 431-445.

First, M. B., Gibbon, M., Spitzer, R. L., & Williams, J. B. W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders - Research Version* (SCID-I, Version 2.0, February, 1996, Final version). New York: Biometrics Research.

Frank, E., Prien, R. F., Jarrett, R., Keller, M. B., Kupfer, D. J., Lavori, P. W., Rush, A. J., & Weissman, M. M. (1991). Conceptualization and rationale for consensus definitions of terms in major depressive disorder: Remission, recovery, relapse, and recurrence. *Archives of General Psychiatry, 48,* 851-855.

Goldapple, K., Segal, Z. V., Garson, C., Lau, M., Bieling, P., Kennedy, S., & Mayberg, H. (2004). Modulation of cortical-limbic pathways in major depression. *Archives of General Psychiatry, 61,* 34-41.

Haaga, D. A. F., Dyck, M. J., & Ernst, D. (1991). Empirical status of the cognitive theory of depression. *Psychological Bulletin, 110,* 215 - 236.

Haaga, D. A. F., Yarmus, M., Hubbard, S., Brody, C., Solomon, A., Kirk, L., & Chamberlain, J. (2002). Mood dependency of self-rated attachment style. *Cognitive Therapy and Research, 26, 57–71.*

Hammen, C. (1991). The generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology, 100,* 555-561.

Hammen, C. (1999). The emergence of an interpersonal approach to depression. In T. Joiner & J. C., Coyne (Eds.), *The interactional nature of depression*. Washington, DC: American Psychological Association.

Halberstadt, J. B., Niedenthal, P. M., & Setterlund, M. B. (1996). Cognitive organization of different tenses of the self mediates affect and decision making. In L. L. Martin & A. Tesser (Eds.), *Striving and feeling: Interactions among goals, affect, and self-regulation* (pp. 123-150). Mahwah, NJ: Lawrence Erlbaum.

Hayes, A. M., Castonguay, L. G., & Goldfried, M. R. (1996). Effectiveness of targeting the vulnerability factors of depression in cognitive therapy. *Journal of Consulting and Clinical Psychology, 64,* 623-627.

Hollon, S. D., & Kendall, P. C. (1980). Cognitive self-statements in depression: Development of an automatic thoughts questionnaire. *Cognitive Therapy and Research, 4,* 383-395.

Hollon, S. D., Thase, M. E., & Markowitz, J. C. (2002). Treatment and prevention of depression. *Psychological Science in the Public Interest, 3,* 39-77.

Ingram, R. E., Bernet, C. Z., & McLaughlin, S. C. (1994). Attentional allocation processes in individuals at risk for depression. *Cognitive Therapy and Research, 18,* 317-332.

Ingram, R. E., & Kendall, P. C. (1986). Cognitive clinical psychology: Implications of an information processing perspective. In R. E. Ingram (Ed.), *Information processing approaches to clinical psychology* (pp. 3-21). London: Academic Press.

Ingram, R. E., Kendall, P. C., Siegle, G., & Guarino, J., (1995). Psychometric properties of the positive automatic thoughts questionnaire. *Psychological Assessment, 7,* 495_507.

Ingram, R. E., Miranda, J., & Segal, Z. V. (1998). *Cognitive vulnerability to depression.* New York: Guilford Press.

Ingram, R. E., & Wisnicki, K. S. (1988). Assessment of positive automatic cognition. *Journal of Consulting and Clinical Psychology, 56,* 898-902.

Joiner, T. E., Jr. (2000). Depression's vicious scree: Self-propagating and erosive processes in depression chronicity. *Clinical Psychology: Science and Practice, 7,* 203-218.

Joiner, T., & Coyne, J. C. (Eds.). (1999). *The interactional nature of depression*. Washington, DC: American Psychological Association.

Kendall, P. C., Marrs-Garcia, A., Nath, S. R., & Sheldrick, R. C. (1999). Normative comparisons for the evaluation of clinical significance. *Journal of Consulting and Clinical Psychology, 67,* 285-299.

Kirsh, G.A., & Kuiper, N.A. (2002). Individualism and relatedness themes in the context of depression, gender, and a self-schema model of emotion. *Canadian Psychology, 43,* 76-90.

Lau, M. A., Segal, Z. V., & Williams, M. G. (2004). Teasdale's differential activation hypothesis: Implications for mechanisms of depressive relapse and suicidal behaviour. *Behaviour Research and Therapy, 42,* 1001-1007.

Lewinsohn, P. M., Steinmetz, J. L., Larson, D. W., & Franklin, J. (1981). Depression-related

cognitions: Antecedent or consequence?. *Journal of Abnormal Psychology, 90,* 213-219.

Linville, P. W. (1987). Self-complexity as a cognitive buffer against stress-related illness and depression. *Journal of Personality and Social Psychology, 52,* 663-676.

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology, 35,* 63-78.

Markus, H. (1990). Unresolved issues of self-representation. *Cognitive Therapy and Research, 14,* 241-253.

Miranda J., Gross, J. J., Persons, J. B., Hahn, J. (1998). Mood matters: Negative mood induction activates dysfunctional attitudes in women vulnerable to depression. *Cognitive Therapy and Research , 22,* 363-376

Miranda, J., & Persons, J. B. (1988). Dysfunctional attitudes are mood-state dependent. *Journal of Abnormal Psychology, 97,* 76-79.

Mongrain, M., & Blackburn, S. (2005). Cognitive vulnerability, lifetime risk, and the recurrence of major depression in graduate students. *Cognitive Therapy and Research, 29,* 747-768.

Myers, J. (1984). *Schematic processing and self-reference during continuous periods of clinical depression and symptomatic remission.* Unpublished doctoral dissertation, University of Calgary, Calgary, Alberta.

Rafaeli-Mor, E., & Steinberg, J. (2002). Self-complexity and well-being: A review and research synthesis. *Personality and Social Psychology Review, 6,* 31-58.

Roemer, L. (2001). Measures for anxiety and related constructs. In M. M. Antony, S. M. Orsillo, & L. Roemer (Eds.). *Practitioner's guide to empirically based measures of anxiety*. New York: Kluwer Academic/Plenum.

Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology, 35,* 677-688.

Safran, J. D., Segal, Z. V., Hill, C., & Whiffen, V. (1990). Refining strategies for research on self-representations in emotional disorders. *Cognitive Therapy and Research, 14,* 143-160.

Schmidt, N. B., Schmidt, K. L., & Young, J. E. (1999). Schematic and interpersonal conceptualizations of depression: An integration. In T. Joiner & J. C. Coyne (Eds.), *The interactional nature of depression* (pp. 127-148). Washington, DC: American Psychological Association.

Segal, Z. V. (1988). Appraisal of the self-schema construct in cognitive models of depression. *Psychological Bulletin, 103,* 147-162.

Segal, Z. V., Kennedy, S., Gemar, M., Hood, K., Pedersen, R., & Buis, T. (2006). Cognitive reactivity to sad mood provocation and the prediction of depressive relapse. *Archives of General Psychiatry, 63,* 749-755.

Shipley, W. C. (1940). A self-administered scale for measuring intellectual impairment and deterioration. *Journal of Psychology, 9,* 371-377.

Solomon, A., Arnow, B. A., Gotlib, I. H., & Wind, B. (2003). Individualized measurement of irrational beliefs in remitted depressives. *Journal of Clinical Psychology, 59,* 439-455.

Solomon, A., & Haaga, D. A. F. (2003). Reconsideration of self-complexity as a buffer against depressive symptoms. *Cognitive Therapy and Research, 27,* 579-591.

Solomon, A., Haaga, D. A. F., Brody, C., Kirk, L., & Friedman, D. G. (1998). Priming irrational beliefs in recovered-depressed people. *Journal of Abnormal Psychology, 107,* 440-449.

Spielman, L. A., & Bargh, J. A. (1990). Does the self-schema really exist? In C. D. McCann & N. S. Endler (Eds.), *Depression: New directions in theory, research, and practice*. Toronto, ON: Wall & Emerson.

Taylor, L. & Ingram, R. E. (1999). Cognitive reactivity and depressotypic information processing in children of depressed mothers. *Journal of Abnormal Psychology, 108,* 202-

210.

Teasdale, J. D., & Dent, J. (1987). Cognitive vulnerability to depression: An investigation of two hypotheses. *British Journal of Clinical Psychology, 26,* 113-126.

Woike, B. A. (1994). The use of differentiation and integration processes: Empirical studies of "separate" and "connected" ways of thinking. *Journal of Personality and Social Psychology, 67,* 142-150.

Young, J. E., Klosko, J. S., & Weishaar, M. E. (2003). *Schema therapy: A practitioner's guide.* New York: Guilford.

Footnotes

1. Given the myriad of gender differences that have been demonstrated with depressive samples (American Psychological Association, 2000) and in the domains of interpersonal and achievement orientation (see Kirsh & Kuiper, 2002) the decision was made to test the hypotheses using data from female participants only. Although such inclusion criteria limit the generalizability of the findings to the male population, experimental control was deemed more powerful than controlling for gender differences statistically.

2. Although Linville's (1987) card-sorting methodology was utilized, the computation of attribute redundancy is conceptually and computationally distinct from self-complexity, the latter of which has been criticized in the literature (Dozois & Dobson, 2001b; Solomon & Haaga, 2003).

3. Attrition was due to four primary reasons: (1) the inability to contact participants by telephone (n = 14); (2) participants declined participation (n = 4); (3) three consecutive appointments were missed (n = 4); and (4) participants had moved out of the city (n = 3). Analyses were performed to compare those participants who completed the follow-up (n = 66) and those who were lost due to attrition (n = 25). Individuals who dropped out of the study were slightly but significantly less well educated (M = 13.24, SD = 1.69) than were those who participated in the follow-up (M = 14.21, SD = 1.92), t (89) = -2.23, $p < .05$. No other demographic differences were found. There were also no significant sociodemographic, patient-related (e.g., suicide attempts, diagnoses, comorbidity), or self-reported symptomatology differences between individuals from the depressed group who did or did not participate at time 2.

4. Although all 16 individuals in the remitted group no longer met diagnostic criteria for major depressive disorder, not all of these participants were *fully* remitted according to criteria

established by the National Institute of Health (Frank et al., 1991). Scores derived from the SCID-I indicated that 5 participants from the remitted group continued to experience diagnostically subthreshold symptomatology. Excluding these individuals did not alter the results reported in this study.

5. Cognitive products have been defined as the automatic thoughts and dysfunctional attitudes that ensue from the activation of the self-schema, whereas cognitive structure refers to the internal organization, representation and storage of information in memory (see Ingram et al., 1998).

6. This hypothesis could not be tested in the current study as only 2 participants had received cognitive therapy.

Table 1

Sample Sociodemographic Features and Differences Across Groups.

Variable	Depressed	Remitted	Controls	
	M (*SD*)/*n* (%)	*M* (*SD*)/*n* (%)	*M* (*SD*)/*n* (%)	Statistic
Age	45.71 (11.15)	40.87 (14.16)	45.12 (15.50)	F (2, 63) = .61
Education	13.76 (1.44)	13.69 (2.33)	14.70 (1.85)	F (2, 63) = 2.19
Shipley Vocabulary	32.59 (5.98)	29.63 (7.09)	33.91 (3.34)	F (2, 63) = 3.70*
Children	1.65 (1.50)	1.69 (1.45)	1.42 (1.44)	F (2, 63) = .232
Marital Status				Π^2 (6) = 1.13
Single	4 (23.5%)	4 (25%)	9 (27%)	
Married/common-law	8 (47%)	8 (50%)	18 (55%)	
Divorced/separated	4 (23.5%)	3 (19%)	4 (12%)	
Widowed	1 (6%)	1 (6%)	2 (6%)	
Employment Status				Π^2 (6) = 4.72
Employed	5 (29%)	8 (50%)	19 (58%)	
Unemployed	10 (59%)	6 (38%)	10 (30%)	
Homemaker	1 (6%)	1 (6%)	3 (9%)	
Student	1 (6%)	1 (6%)	1 (3%)	

Note. Depressed, n = 17; Remitted, n = 16; Controls, n = 33.
*$p < .05$

Table 2

Patient-Related Variables and Differences Between Stable Depressed and Remitted Groups

	Depressed	Remitted	Statistic
	M (*SD*)	*M* (*SD*)	
Age of First Episode	26.23 (12.42)	30.35 (13.29)	t (31) = 1.38
Previous Episodes	7.71 (3.60)	6.14 (4.31)	t (29) = 1.10
Comorbidity	14 (82%)	10 (63%)	Π^2 (1) = 1.92
Psychotherapy	11 (65%)	9 (56%)	Π^2 (1) = .25
Suicide Attempts	7 (41%)	3 (19%)	Π^2 (1) = 1.96
Antidepressants	15 (88%)	12 (75%)	Π^2 (1) = .97
Antianxiolytics	6 (35%)	3 (19%)	Π^2 (1) = 1.14
ECT	2 (12%)	0 (0%)	Π^2 (1) = 2.00

Note. Depressed, n = 17; Remitted, n = 16; Suicide Attempts = whether or not suicide has ever been attempted; ECT = electroconvulsive therapy.

*$p < .05$

Table 3

Symptom Severity Scores Across Time

	Depressed		Remitted		Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
BDI-II	39.65 (10.42)	33.06 (12.12)	33.93 (8.47)	15.56 (8.37)	1.88 (2.46)	2.20 (2.80)
BAI	29.71 (14.88)	26.88 (14.59)	21.60 (10.38)	12.50 (6.32)	2.42 (1.82)	2.57 (2.45)

Note. Depressed, n = 17; Remitted, n = 16; Controls, n = 33; BDI-II = Beck Depression Inventory-II; BAI = Beck Anxiety Inventory.

Table 4

Group Differences on the Automatic Thoughts Questionnaires at Time 1 and Time 2.

	Depressed		Remitted		Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
ATQ-N	109.63 (29.70)	93.50 (33.40)	100.67 (23.10)	69.00 (25.23)	34.37 (4.60)	33.57 (5.04)
ATQ-P	56.50 (16.96)	56.81 (22.38)	68.17 (16.59)	83.67 (21.68)	122.30 (25.61)	116.63 (28.52)

Note. Depressed, n = 17; Remitted, n = 16; Controls, n = 33; ATQ-N = Automatic Thoughts Questionnaire – Negative; ATQ-P = Automatic Thoughts Questionnaire – Positive.

Table 5

Cognitive Organization Scores Across Time.

	Depressed		Remitted		Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
PDST: Interstimulus Distance						
Interpersonal positive	.39 (.37)	.42 (.24)	.38 (.34)	.26 (.26)	.06 (.19)	.05 (.13)
Interpersonal negative	.67 (.48)	.67 (.38).	.83 (.51)	.99 (.46)	1.25 (.47)	1.11 (.41)
Achievement positive	.93 (.56)	.81 (.53)	.66 (.42)	.49 (.49)	.17 (.24)	.18 (.25)
Achievement negative	.42 (.41)	.46 (.45)	.53 (.28)	.96 (.44)	1.61 (.34)	1.45 (.46)
Attribute Redundancy						
Interpersonal positive	.41 (.17)	.46 (.20)	.37 (.14)	.54 (.17)	.51 (.16)	.47 (.14)
Interpersonal negative	.31 (.15)	.28 (.19)	.25 (.14)	.28 (.13)	.22 (.18)	.16 (.13)
Achievement positive	.30 (.18)	.29 (.14)	.32 (.16)	.38 (.19)	.36 (.14)	.38 (.16)
Achievement negative	.35 (.20)	.29 (.18)	.21 (.11)	.24 (.15)	.09 (.12)	.11 (.17)

Note. Depressed, n = 17; Remitted, n = 16; Controls, n = 33; Data from the PDST were not normally distributed and were consequently transformed logarithmically.