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Changes in Core Beliefs (Early Maladaptive Schemas) and Self-Representation in Cognitive Therapy and Pharmacotherapy for Depression

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Abstract

Randomized clinical trials suggest that cognitive therapy (CT) is comparable to antidepressant medication for the acute treatment of depression. Compelling data also indicate that CT has an added prophylactic benefit relative to pharmacotherapy (PT). The purpose of this study was to examine cognitive change in CT for depression. Participants (N = 42) met diagnostic criteria for a current major depressive episode and were randomly assigned to CT+PT or PT. Participants completed indices of depressive symptomatology, core beliefs (i.e., early maladaptive schemas) and self-attribute redundancy before and after therapy. Self-attribute redundancy was conceptualized as a form of schema organization and operationalized as the number of similar traits that permeate different aspects of self (e.g., as a partner, friend, employee). Treatment change was evident in both groups on self-reported core belief domains, with few between-group differences. Although no group differences were found on attribute redundancy at pre-treatment, there was a significant increase in positive redundancy at post-treatment favouring CT+PT. No group differences were found for negative content. These findings suggest that something about CT may uniquely impact self-representation and that CT may operate by bolstering compensatory schemas.

Key words: cognitive therapy; depression; cognitive change; schema; early maladaptive schemas; core beliefs

Major depressive disorder (MDD) is a highly recurrent disorder (Monroe & Harkness, 2011) that impairs various aspects of an individual's life including his or her emotional, cognitive, behavioural, physiological, and interpersonal functioning. In the depression literature, several randomized control trials have concluded that Cognitive Therapy (CT) is an efficacious treatment for acute symptom relief, comparable to the use of antidepressant medication (for review, see DeRubeis, Webb, Tang, & Beck, 2010). In addition, CT has been shown to have a prophylactic effect, with the risk of relapse for patients treated with CT comparable to individuals on maintenance medication (Dobson et al., 2008; Hollon, Thase, & Markowitz, 2002) and lower than patients previously treated with, but no longer taking, antidepressant medication (DeRubeis et al., 2010; Dobson et al., 2008; Hollon et al., 2002; Hollon et al., 2005). The durability of this effect also appears to endure for several years (Paykel et al., 2005). Although a large evidence-base supports the efficacy of CT for depression, and a wide variety of other psychological disorders (for a review see Epp & Dobson, 2010), the exact mechanism(s) through which CT brings about effective therapeutic change and relapse prevention remain unclear (Bennett-Levy, 2003; Ching & Dobson, 2010; Garratt, Ingram, Rand, & Sawalani, 2007).

One potential explanation stems from the literature on cognitive vulnerability to depression, which contends that an important mechanism in the development and maintenance of psychopathology concerns the content and process of an individual's thinking (Beck, 1967; Beck, Rush, Shaw, & Emery, 1979; Clark, Beck, & Alford, 1999; Dozois & Beck, 2008). According to Beck's (1967) cognitive theory of depression, negative or depressive schemas develop as a result of an individual's early life interactions with others. These schemas remain in a dormant state until triggered by stressful life experiences, at which time they lead to the

selective extraction and transformation of information to fit one's pre-existing belief system. Once activated, a depressogenic self-schema leads to a constriction of the cognitive field, resulting in negative and schema-congruent information processing as well as negative automatic thoughts, beliefs, and maladaptive behaviours (Dozois & Beck, 2008). It follows from this model that changes in key cognitive processes through treatment would be critical for an individual's sustained recovery from depression.

Cognitive Change in Cognitive Therapy

A number of studies have demonstrated that negative cognitive products, including automatic thoughts and dysfunctional attitudes, dissipate as depression improves following CT (see Garratt et al., 2007, for review). An extension of this literature includes studies that provide a direct link between in-session cognitive changes and significant symptom relief following CT. For example, sudden gains in treatment, operationalized as substantial improvement in symptoms of depression in one between-session interval, have been found to occur following a session in which there was substantial cognitive change, and to predict improved long-term outcomes (Tang & DeRubeis, 1999; Tang, DeRubeis, Beberman, & Pham, 2005; see Aderka, Nickerson, BØe, Hofmann, 2012, for a meta-analytic review). Similarly, Forman et al. (2012) demonstrated that the use of cognitive and affective change strategies by patients across sessions (e.g., challenging and restructuring dysfunctional cognitions and the ability to step back from thoughts and view them as mental processes rather than absolute truths) mediated positive symptom change in CT. Although it is clear that CT is related to beneficial cognitive change, depressed individuals treated with PT also experience a decrease in negative cognitions (Garratt et al., 2007). One difference between those individuals treated with CT versus PT may, therefore, lie in their cognitive reactivity to depressed mood.

Cognitive reactivity is often assessed using a negative mood manipulation. The rationale is that a transient negative mood prime may be required to activate latent cognitive vulnerabilities and increase their accessibility during assessment (see Evraire, Dozois, & Hayden, in press). Indeed, individuals treated with CT for depression have been shown to experience less cognitive reactivity (i.e., exhibiting less of an increase in dysfunctional attitudes) following a negative mood prime than do individuals treated with PT (Segal et al., 1999; Segal et al., 2006). In a sample of individuals who had responded to CT, Strunk, Adler, and Hollars (2013) demonstrated that the acquisition of CT skills was related to less cognitive reactivity following a negative mood induction post-treatment (also see Hundt, Mignogna, Underhill, & Cully, 2013). In remitted individuals, the magnitude of cognitive reactivity following a negative mood prime is strongly associated with the likelihood of relapse/recurrence of depression (Segal et al., 1999; Segal et al., 2006; Strunk, DeRubeis, Chiu, & Alvarez, 2007). These findings support the idea that cognitive reactivity is an important mechanism of change in CT, a process which may be unique to CT. While both CT and PT are associated with decreases in negative thinking, individuals treated with PT alone appear to experience greater cognitive reactivity which is associated with relapse or recurrence. Thus, deeper cognitive change may to be a potential mechanism through which CT demonstrates it prophylactic superiority relative to PT (Beck & Dozois, 2011; Garratt et al., 2007).

Core Beliefs (Early Maladaptive Schemas) and Self-Representation

The empirical evidence clearly supports the idea that CT for depression is associated with changes in cognitive content and products (e.g., Garratt et al., 2007), but a dearth of research has examined underlying changes in deeper self-schematic structures related to CT. Self-schemas, which are well-organized, internal representations of self, consist of both propositional (content)

elements (e.g., core-beliefs; Dozois & Beck, 2008) and structural (organization) properties. Schema content typically reflects themes of interpersonal loss or rejection, or a failure to achieve a desired goal (Beck, 2011; Brewen, 2006). This content, and associated memories, becomes increasingly consolidated and structured though past experiences and plays a role in organizing and structuring new experiences. Once triggered by natural or laboratory-induced stressors, these schemas impact the emergence of negative automatic thoughts and dysfunctional attitudes. In this study, we examined both the content and the structure of schema by focusing on Young's (Young, 1999; Young, Klosko, & Weishaar, 2003) assessment of early maladaptive schemas (which theoretically capture deeper core beliefs related to self) and the organization of self-referent content.

Young and his colleagues (Young, 1999; Young et al., 2003) described core beliefs that originate from repetitious, aversive experiences in childhood (e.g., insecure attachments that result in unmet core emotional needs) and labelled these Early Maladaptive Schemas (EMS). EMS may, however, be more accurately described as core beliefs – in other words, they relay information about the *content* of a schema but do not provide information about its *organization* (see Dozois & Beck, 2008). These beliefs, or EMSs, are defined as broad, pervasive themes or patterns that are comprised of memories, emotions, cognitions, and bodily sensations regarding self and one's relationships with others, and influence how an individual processes later experiences, thinks, acts, feels, and relates to others throughout life (Young, et al., 2003). Specific EMS (i.e., Shame, Defectiveness, Insufficient Self-Control, Failure, Social Isolation) have been shown to predict depression prospectively (Oei & Baranoff, 2007) and demonstrate evidence of temporal stability. Riso et al. (2006) examined the long-term stability of EMS in a sample of 55 depressed outpatients. EMS demonstrated moderate to good stability (r = .43-.83)

over a period spanning 2.5 to 5 years. Relative stability remained fairly high even after controlling for levels of depression and neuroticism.

In contrast to schema content, schema structure has been evaluated using the *Redundancy Card Sorting Task* and the *Psychological Distance Scaling Task* (PDST; Dozois & Dobson, 2001a, 2001b). The Redundancy Card Sorting Task measures the number of similar traits (positive and negative adjectives) that permeate across different aspects of self (e.g., as a friend, mother, spouse). Research using this task has found that individuals with depression, or comorbid depression and anxiety, exhibit significantly greater negative and less positive attribute redundancy than controls (Dozois & Dobson, 2001b). Also, negative attribute redundancy remains stable regardless of clinical improvement in symptoms of depression (Dozois & Dobson, 2001a). The PDST is a computerized task in which participants rate self-referential adjectives on a grid based on both valence and self-descriptiveness. The manner by which individuals organize adjective content on this task is presumed to reflect the degree of interconnectedness of self-referent content or schema consolidation. Similar to findings using the card sort task, research using the PDST has found that individuals who suffer from depression have stronger associations among negative self-referent content and less interconnectedness for positive content (Dozois & Dobson, 2001b). Furthermore, negative self-referent content appears to remain stable even in individuals who no longer meet diagnostic criteria for major depression (Dozois & Dobson 2001a). Subsequent research has replicated these findings and also demonstrated that the stability of negative cognitive organization is specific to interpersonal self-referent content (Dozois, 2007).

Dozois et al. (2009) extended this research by examining whether CT could lead to changes in cognitive organization, since CT was designed to target and alter deeper cognitions (Beck &

Dozois, 2011; Garrett et al., 2007). Using the PDST with a sample of complex patients who had a long history of Major Depressive Disorder (MDD) and comorbid conditions, we demonstrated that individuals suffering from depression who received CT+PT, but not PT alone, showed significant changes in both positive and negative cognitive organization. Individuals treated with CT+PT had significantly greater cognitive organization for positive interpersonal content and less organization for negative interpersonal content following treatment than did those treated with PT alone. Furthermore, individuals in the CT+PT condition showed significant pre-post changes on positive and negative cognitive organization, whereas those in the PT alone condition failed to exhibit changes in cognitive structure. These findings suggest that depressive schemas can be altered by CT, and highlight a putative mechanism through which CT has an added benefit over PT (i.e., by altering deeper cognitive structures, thereby reducing risk for future cognitive reactivity and subsequent relapse).

Current Study

The majority of research on the efficacy of CT has examined how treatment influences more surface level cognitions (automatic thoughts and dysfunctional attitudes; Garratt et al., 2007). More deeply rooted cognitions, including cognitive schemas, have not been examined as consistently, despite evidence to suggest that they may help to explain one mechanism through which CT demonstrates superiority to PT (Dozois et al., 2009). As such, the primary objective of this research was to test the role of schemas (both their content and organization), as a potential cognitive mechanism underlying the efficacy of CT. We previously examined the influence of CT on cognitive organization. In this case, schematic structure was operationalized as the organization of self-referent adjectives pertaining to an overall view of the self (see Dozois et al., 2009). Given the notion that there are “multiple selves” that become active at different times and

in different circumstances (e.g., Brewen, 2006; Markus & Nurius, 1986), cognitive organization was further broken down, in the current study, and examined across different idiosyncratically-defined aspects of self (e.g., friend, mother, and spouse). A novel aspect of this study was that, in addition to assessing cognitive organization, within this same paradigm we included a measure of cognitive content, or early core beliefs so that we could examine both the structural and propositional elements of schema during treatment.

In terms of cognitive content, we predicted that early core beliefs would improve significantly following both CT+PT and PT. Consistent with previous research (Dozois, 2007; Dozois et al., 2009; Dozois & Dobson, 2001a), we expected that a different index of cognitive organization would reveal that individuals who completed CT+PT would exhibit less negative attribute redundancy and greater positive attribute redundancy, than patients treated solely with PT. All hypotheses were tested in a real-world "effectiveness" sample of patients who were referred to a tertiary care clinic.

Method

Participants

The sample was comprised of 42 individuals (31 females, 11 males) with a primary diagnosis of MDD. Participants were selected from successive referrals to an outpatient mood disorders program. The average age of participants was 46.50 (*SD* = 10.40) years and the majority of the sample was White (98%). Most individuals had completed at least some post-secondary education (79%) and were employed outside of the home (64%). Marital status was as follows: 55% married/common-law, 24% divorced or separated, 19% single and 2% widowed. Inclusion criteria included a current diagnosis of MDD, minimum 8th-grade education and sufficient verbal skills to complete the questionnaires and cognitive tasks. Exclusion criteria consisted of current substance abuse or dependence, past or current bipolar disorder or a

psychotic spectrum disorder, active psychosis, significant cognitive impairments or electroconvulsive therapy within the past year. Participants were also excluded if they had received any previous cognitive-behavioral therapy or were considered treatment resistant (see Dozois et al., 2009, for additional details). No significant differences were found between groups on any of the demographic or patient-related variables (see Dozois et al., 2009).

Measures

Beck Depression Inventory-II (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) consists of 21 items each of which is rated on a 4-point scale from 0 to 3, with higher scores indicating greater severity. Considerable psychometric evidence supports the reliability and validity of this instrument (Beck et al., 1996; Dozois & Dobson, 2010). The internal consistency (Cronbach's alpha) of the BDI-II in this study was .89 at initial assessment and .95 post-intervention.

Hamilton Rating Scale for Depression (HAMD). The HAMD (Hamilton, 1960, 1967) is a 21-item clinician-rating scale that has been used extensively in psychotherapy outcome trials. Seventeen of the items are formally scored (0-4) with total scores ranging from 0-52. The HAMD provides a reliable and sensitive index of primarily behavioral and somatic symptoms of depression (see Dozois & Dobson, 2010). The internal reliability of the HAMD in this study was excellent ($\alpha = .85$ at baseline and post-treatment)

Young Schema Questionnaire – Short Form (YSQ-SF; Young & Brown, 2003). The YSQ – SF is a 75-item self-report scale designed to measure 15 different core beliefs. Each item is rated from 1 (completely untrue of me) to 6 (describes me perfectly). Various studies have supported the psychometric properties of the YSQ-SF (e.g., Hoffart et al., 2005; Welburn et al., 2002). Halvorsen, Wang, Eisemann, and Waterloo (2010) found that the long form of this instrument predicted depressive symptomatology and episodes of MDD over a 9-year follow-up period. The

presence of a consistent factor structure has, however, been more equivocal (e.g., Oei & Baranoff, 2007; Samuel & Ball, 2013).

Hoffart et al. (2005) evaluated the higher-order structure of the 15 EMSs on the short-form of the YSQ using confirmatory factor analysis. These researchers tested a number of solutions and found that a four factor model yielded the most parsimonious solution. The schema domains represented in this solution were Disconnection (comprised of Emotional Deprivation, Emotional Inhibition, Mistrust/Abuse, Social Isolation and Defectiveness), Impaired Autonomy (which consisted of EMSs of Subjugation, Dependence, Failure, Vulnerability, Abandonment, Enmeshment and Insufficient Self-control), Impaired Limits (made up of Insufficient Self-control and Entitlement) and Exaggerated Standards (composed of Self-Sacrifice and Unrelenting Standards). Although research has yielded somewhat inconsistent findings regarding the factorial validity of the YSQ-SF (e.g., Oei & Baranoff, 2007; Samuel & Ball, 2013), the schema domains from Hoffart et al. (2005) were utilized because this confirmatory factor analysis was carefully conducted on more than one-thousand participants in 5 samples of psychiatric groups and one non-patient sample across 6 different sites. The average internal reliability (Cronbach's alpha) across the YSQ-SF domains in this study was .88 (range = .82-.92) at baseline assessment and .89 (range = .80-.95) at the post-intervention assessment.

Redundancy Card-Sorting Task. A card sorting task, modified from Linville (1987), was used to measure a particular form of cognitive organization that we have previously labelled attribute redundancy (see Dozois & Dobson, 2001a, 2001b). Attribute redundancy is operationalized as the number of similar traits that are represented across different aspects of self (e.g., as a friend, employee, partner). The output from this task is conceptually analogous to Bower's (1981) spread of affectivity model (see also Scher, Ingram, Segal, 2005).

Participants were given a deck of 80 cards, with each card containing one adjective. They were instructed to sort the traits into piles that they believed clustered together in describing different aspects of self. Each card contained a number in the upper right corner from which participants transcribed the number corresponding to each card onto response sheets. Participants provided labels for different facets that they thought were important in defining self. They were instructed to indicate (by writing down each card's identification number) which of these traits applied to each of the various self-aspects that they had listed. A given adjective was listed only if it pertained to one or more of the self-aspects. As such, the adjectives could be used repeatedly across different facets of self or, if irrelevant to any self-aspect, omitted altogether.

Attribute redundancy was computed separately for four content sets: interpersonal positive, interpersonal negative, achievement positive and achievement negative. Each attribute redundancy score was calculated as the total of all adjective repetitions across self-aspects, controlling for the number of self-aspects in a given card sort and the number of adjectives used:

$$\text{Attribute Redundancy} = \frac{1}{n_{dw} \times n_{dg}} \sum_{i = 1\text{-}20} n_{ri},$$

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 interpersonal/achievement positive or negative adjective.

Adjective Stimuli. The stimuli for the card-sorting task were comprised of 80 adjectives (20 interpersonal positive, 20 interpersonal negative, 20 achievement positive, 20 achievement negative). Examples of the interpersonal adjectives were *admired, comforted, encouraged, alone, rejected,* and *unwanted*. The achievement-related stimuli were adjectives such as *capable, respected, successful, defeated, deficient,* and *incompetent*. All four word lists were statistically

equivalent on the average frequency of word use in the English language, word length, emotional intensity, and imaginability (see Dozois, 2007; Dozois & Frewen, 2006).[1]

Procedure

To ensure that participants met the principal eligibility criterion, they were assessed using the Structured Clinical Interview for DSM-IV Axis I Disorders-Research Version (SCID-I, Version 2.0; First, Gibbon, Spitzer, & Williams, 1996). SCID-I interviews were audio-recorded so that a diagnostician, blind to the study design, could review a random number of structured interviews and determine inter-rater reliability. Inter-rater reliability was excellent, with a kappa coefficient of 1.00 for MDD and 0.96 for other diagnoses. Following their SCID-I interviews, participants completed depression symptom measures, the YSQ-SF and the Redundancy Card-sorting Task. Additional symptom-based and cognitive measures were also administered, some of which are described in a previous report (see Dozois et al., 2009). Participants were then randomly assigned to one of two groups: cognitive therapy plus pharmacotherapy (CT+PT) or pharmacotherapy (PT). As such, all participants in this study were treated to therapeutic dose with an antidepressant, the main between-group difference being the administration of CT. After treatment, participants were re-administered the SCID-I, questionnaires, and cognitive task.

Cognitive Therapy. In addition to treatment with pharmacotherapy, participants in the CT+PT arm of the trial received 15 individual sessions (1 hour each week) of CT, administered according to evidence-based treatment protocols (see Beck et al., 1979; Beck, 2011; see Dozois & Bieling, 2010). Treatment was delivered by two licensed therapists, each with several years of

[1] Although this task was based on Linville's (1987) card-sorting methodology, the computation of attribute redundancy is conceptually and computationally distinct from self-complexity; the latter of which has been criticized in the literature (see Dozois & Dobson, 2001b).

experience in the delivery of CT; the therapists were supervised by two Ph.D. psychologists both of whom are certified Fellows with the Academy of Cognitive Therapy.

Pharmacotherapy. All participants received a therapeutic dose of pharmacotherapy at the beginning of the trial. They also received 8-15 sessions of clinical management. The treating psychiatrist was blind to group randomization and followed the most current Canadian treatment guidelines available during the study period (Kennedy et al., 2001). Participants received SSRI's, SNRI's or Tricyclics, combined with various augmenting strategies whenever required (see Dozois et al., 2009). Participants in the PT group were instructed not to receive psychotherapy during the duration of the trial. At the completion of the study, however, these participants were provided with the option of CT.

Patient flow. A total of 55 individuals were assessed for eligibility. Seven of these individuals were excluded or refused to participate. The remaining participants were randomly allocated to CT+PT (n = 25) or to the PT arm (n = 23). Some of these individuals dropped out of the study or could not be reached prior to receiving any intervention (n = 5) and one participant was excluded from the analyses secondary to experiencing a major traumatic event just prior to the post-treatment assessment. The final data set was comprised of 21 individuals in each group.

Results

Symptomatology

In our earlier report (i.e., Dozois et al., 2009), we presented the findings for changes in depressive symptoms over the course of treatment. Rather than recapitulate these data, we instead highlight the overall findings. No significant group differences were obtained in depressive symptomatology as assessed by the BDI-II or HAMD either pre- or post-treatment. Both groups demonstrated statistically equivalent change and improved significantly over the

course of treatment. For example, mean BDI-II scores for the CT+PT group were 30.57 (*SD* = 9.75) and 10.90 (*SD* = 12.29) at pre- and post-treatment, respectively. These pre-post scores were 26.95 (*SD* = 10.52) and 14.29 (*SD* = 10.34) for the PT condition. Analyses using the SCID-I revealed no significant between-groups difference on the proportion of individuals who were remitted post-treatment (CT+PT = 81%, PT = 67%).

Early Maladaptive Schemas

Table 1 presents mean (standard deviation) item scores for each of the four early maladaptive schema domains pre- and post-treatment for each group. Each of the four domains was analyzed with a 2 (Group) by 2 (Time) split-plot Analysis of Variance (ANOVA). The first analysis involved the Disconnection Domain defined as beliefs of being unwanted, inferior or unlovable. For the Disconnection Domain, there was only a significant effect of Time, $F(1,40) = 23.26$, $p < .001$. Neither the Group nor the Group x Time interaction were significant. This same Time main effect also held for Impaired Autonomy, $F(1,40) = 16.20$, $p < .001$, and Exaggerated Standards, $F(1,40) = 9.17$, $p < .01$, with no group or interaction effects. A statistically significant main effect of Time was found for Impaired Limits, $F(1,40) = 17.15$, $p < .001$, which was qualified by a significant Group x Time interaction, $F(1,40) = 4.94$, $p < .05$. Analyses of simple effects revealed that this was due exclusively to a significant within-group improvement from pre- to post-treatment in the CT+PT group, $t(20) = 4.54$, $p < .001$.

Attribute Redundancy

Attribute redundancy scores for positive and negative interpersonal and achievement content are presented in Table 2. These data were analyzed for interpersonal and achievement content separately. A 2 (Group) by 2 (Time) by 2 (Valence) split-plot ANOVA was conducted with the organization of interpersonal content as the dependent variable. The three-way interaction was

statistically significant, $F(1,41) = 7.15$, $p = .01$. Examination of simple effects revealed no significant between-group differences at pre-treatment for interpersonal positive, $t(40) = 1.79$, p = ns, or negative, $t(40) = 1.07$, *p ns*, content. Group differences were found, however, post-treatment. Individuals treated with CT+PT showed significantly greater attribute redundancy for positive, $t(40) = 4.12$, $p < .001$, but not negative, $t(40) = .14$, $p = ns$, content than those treated with PT alone. When within-subjects contrasts were inspected, individuals in the CT+PT group showed significant pre-post changes for positive, $t(20) = 4.03$, $p < .001$ content only. Participants in the PT group showed no significant pre-post changes for positive or negative content.

A similar mixed ANOVA was also conducted using achievement content as the dependent variable. This analysis revealed a main effect of valence, $F(1, 40) = 7.50$, $p < .01$, which was qualified by a significant two-way interaction of Valence x Time, $F(1,40) = 7.70$, $p < .01$. There were no significant differences between positive and negative content pre-treatment, $F(1,41) = .42$, *p ns*. However, there was greater redundancy for positive than negative content post-treatment, $F(1,41) = 12.14$, $p < .001$. Although the three-way interaction was not significant, we nonetheless analyzed between- and within-group differences given a priori hypotheses that group differences would emerge as a function of treatment. Consistent with the analyses for interpersonal content, the groups were statistically equivalent on positive and negative content at pre-treatment. The CT+PT group, however, exhibited significantly greater attribute redundancy of positive content at post-treatment than did the PT group, $t(40) = 2.83$, $p < .01$. Group differences were not significant for negative content. Individuals in CT+PT also showed a significant increase in positive attribute redundancy only from pre- to post-treatment, $t(20) = 2.88$, $p < .01$ whereas no significant differences were obtained for individuals in PT.

Discussion

Depression is a highly recurrent condition with 50-85% of diagnosed individuals experiencing multiple episodes; the risk for recurrence increases with each successive episode (Keller & Boland, 1998; Monroe & Harkness, 2011). Although CT is one of the most effective psychological treatments for depression, especially when relapse rates are taken into account (DeRubeis et al., 2010), many questions remain regarding how CT leads to cognitive change in depression and whether cognitive change is even necessary (e.g., Longmore & Worrell, 2007; but see Hofmann, 2008). One proposed mechanism involves lowered cognitive reactivity in individuals treated with CT versus PT, likely the result of a combination of learned cognitive coping strategies and the alteration of deeper cognitions or schemas (Dozois et al., 2009; Segal et al., 1999; Segal et al., 2006; Strunk et al., 2013). The current study was among the first to examine how CT affects deeper, more structural components of cognitive change (cf. Haubert & Dobson, 2007; Dozois et al., 2009).

In line with our hypothesis that EMSs would dissipate in both groups as depression improved, there was an improvement in each of the four domains of schemas (disconnection, impaired autonomy, impaired limits, and exaggerated standards) from pre- to post-treatment in CT+PT and PT. These findings are consistent with the extant literature that both CT and PT are capable of altering the more surface level content of an individual's thinking in depression (Dozois et al., 2009; Garratt et al., 2007). An interesting result that was not predicted was the finding that individuals in the CT+PT group experienced significantly greater improvement in the impaired limits domain, compared to those in the PT only group. One important component of the impaired limits domain is the core belief of insufficient self-control, which is often characterized by a lack of self-control with respect to controlling the expression of emotions, along with discomfort avoidance (e.g., avoiding pain, conflict, or responsibility) at the expense

of goal attainment or personal fulfilment (Young et al., 2003). Knowing that an important goal in CT is to teach skills that help individuals gain more control over their negative thinking and processing (Beck, 2011), and subsequently their mood and behaviour, it seems reasonable to assume that CT would also contribute to a greater sense of perceived self-efficacy. In line with this idea, research has demonstrated that greater self-efficacy following CT for depression also reduces an individual's risk of relapse (Vittengl, Clark, & Jarrett, 2010). Thus, although changes in deeper cognitive structures have been suggested as a potential mechanism through which CT demonstrates a prophylactic effect over PT, an increase in an individual's sense of control over his or her emotions and the environment, may serve as another potential mechanism through which CT operates uniquely. Additional research is needed to further delineate how changes in beliefs about self-control or self-efficacy are related to cognitive change, symptom improvement, and risk of relapse in depression.

Consistent with our hypothesis, individuals in the CT+PT group displayed significantly greater attribute redundancy for positive interpersonal content post-treatment than did those treated with PT alone. Furthermore, individuals in the CT+PT group exhibited significantly greater attribute redundancy for positive interpersonal content from pre- to post- treatment, whereas a change in attribute redundancy across treatment was not seen in the PT group. Contrary to previous research using this sample (Dozois et al., 2009), and our hypothesis, individuals in the CT+PT group did not display any significant pre-post differences on negative interpersonal attribute redundancy. Even though between group differences were not found for achievement content, individuals in the CT+PT group experienced a significant increase in the organization of positive content from pre- to post-treatment. Pre-post differences were not found for individuals treated with PT alone. These results suggest that CT may lead to recovery by

targeting and altering underlying negative representations (Dozois et al., 2009; Garratt et al., 2007), while also helping to create or strengthen competing positive representations (Brewin, 2006; Dozois et al., 2009).

Cognitive vulnerability models of psychopathology (e.g., Beck, 1967) typically focus on negative cognitive schemas and often fail to consider the role that positive schemas play in the development and maintenance of disorders such as depression (see Clark et al., 1999; Keyfitz, Lumley, Hennig, & Dozois, 2013). However, considerable evidence supports the importance of focusing on positive cognition both in terms of vulnerability (e.g., Abramson, Alloy, & Metalsky, 1989; MacLeod & Salaminiou, 2001) and treatment (e.g., Clark, 2014; Dozois et al., 2009). The findings of the current study suggest that CT is able to modify positive cognitive organization.

In their classic review of cognitive change in CT, Barber and DeRubeis (1989) proposed a model in which CT may produce its effects through the development and implementation of (behavioural and cognitive) compensatory skills. Among these skills are metacognitive skills, in which individuals treated for depression learn to generate alternative thoughts or explanations for events, other than those automatically generated by a depressive schema, and learn to examine the evidence for competing interpretations. Over time, greater skill use leads to a reduction in negative cognitive products, and information processing begins to incorporate positive information when generating expectations and interpretations; consistent use of compensatory skills subsequently contributes to changes in deeper cognitions, such as cognitive structures (Barber & DeRubeis, 1989; Brewen, 2006). Although the depression literature has demonstrated a link between cognitive therapy skills and risk of relapse following a successful course of treatment (e.g., Strunk et al., 2013), future research is needed to determine whether change in

cognitive organization mediates the relationship between the use of CT skills and reduced risk for relapse following treatment (see Hundt et al., 2013).

The finding that CT+PT was associated with changes in positive but not negative attribute redundancy contradicts our previous findings (Dozois et al., 2009) that CT+PT was associated with changes in both positive and negative cognitive interpersonal organization, as assessed using the PDST. One explanation for this discrepancy has to do with the way in which cognitive organization was conceptualized and operationalized in each of the tasks. The PDST measures cognitive organization in terms of an overall view of self. Specifically, participants rate various words in terms of where they fit in psychological space on self-descriptiveness and valence for them. The interstimulus distances of each self-descriptive adjective-adjective combination are then used as an index of cognitive organization. In contrast, the Redundancy Card-Sorting Task examines organization at the level of different facets of self, rather than conceptualizing self as a unitary construct (Markus, 1977; Markus & Nurius, 1986). In line with the compensatory skills model discussed above, an individual may continue to experience negative views of self, following treatment, but test and challenge such views by considering and incorporating a more positive perspective of self, using the skills learned in therapy (Barber & DeRubeis, 1989; Brewen, 2006). The inclusion of more positive attributes across different aspects of self, may then contribute to a more connected overall positive sense of self and less interconnected negative sense of self as observed by Dozois et al. (2009). Future research is warranted to further examine the impact that CT has at different levels of cognitive organization, and to determine the extent to which changes at the level of different aspects of self are associated with subsequent changes in overall cognitive organization.

This study was among the first to examine the influence of CT+PT and PT on both the structural (organization) properties and propositional (content) elements of schemas. These findings have important implications for CT, and elucidate potential mechanisms through which CT may be associated with a reduced risk for relapse of depression. Although previous research has demonstrated that both CT and PT have the ability to reduce negative automatic thoughts and related cognitive content, the current study found that CT+PT, but not PT alone, was related to an individual's increased sense of self-control or efficacy, a variable known to be associated with lower rates of depression relapse (Vittengl et al., 2010). Not only does CT target changing surface and deeper level cognitions, but it also serves the important function of increasing an individual's confidence in regulating thinking, feeling, and behaviour, and subsequently the ability to achieve personal goals.

Research examining cognitive reactivity to a negative mood state has demonstrated that individuals treated with CT, particularly those with greater CT skills, experience reduced reactivity following a negative mood induction compared to those treated with PT (Segal et al., 1999; Strunk et al., 2013). Reduced cognitive reactivity is also associated with a decreased risk for relapse (Segal et al., 2006). Although the explanations for this reduced risk are just beginning to surface (Strunk et al., 2013), one potential mechanism through which individuals treated with CT may experience less reactivity is through the alteration of deeper cognitive structures, or schemas, that play a role in mood-congruent activation. These findings suggest that depressive schemas can be altered by CT which may then lead to a reduced likely of future episodes of depression.

Although the current study contributes to the literature on CT in important ways, a number of limitations should be noted. First, we did not examine the independent effects of CT

alone, in comparison to PT, or CT+PT. As such, it is not possible to conclude definitively that changes in cognitive content and organization occurred because of CT, since they may have been influenced by the combination treatment. It will be important for future research to examine the differential effects of CT, PT, and CT+PT on the structure and content of cognitive schemas. Quilty, Dozois, Lobo, Ravindran, & Bagby (in press, this issue), for example, recently compared cognitive-behavioral therapy to pharmacotherapy on self-referent processing and cognitive structure (as assessed using both the Redundancy Card-Sorting Task and the PDST). For the most part, these cognitive indices changed equally across both treatments. Such findings call into question the idea that cognitive organization or structure shifts uniquely in CT. Despite this limitation, the participants reflected a real world sample, given that most patients referred for CT are typically on an antidepressant medication, particularly individuals with a history of depression and those who are coping with comorbid conditions, as was the case with the current sample. Utilizing this sample increases the generalizability of these findings to everyday practice, and is consistent with recent shifts in the literature to more "effectiveness" trials. A second limitation pertains to the demographics of the sample, which was fairly homogenous. The majority of patients were White, highly education, and employed outside of the home, and so the applicability of these findings to different populations of individuals suffering from depression (e.g., different ethnicities, unemployed) remains uncertain. The sample size was also small which limits the generalizability of these findings.

Given that studies on CT and changes in deeper cognitions (schemas) are just beginning to flourish, an important line of future research will be to examine these therapy-related changes in greater depth. For example, in-session changes in cognitive organization and content may be examined in relation to changes in symptoms of depression or the acquisition of CT skills. How

cognitive organization and content affects cognitive reactivity and subsequent risk for relapse, are also important areas for future research.

The results of this study provide support for Beck's (1967) cognitive vulnerability model of depression which suggests that the development and maintenance of depression stems from deeper cognitive structures or schemas. Unitary (Dozois et al., 2009) and multidimensional cognitive schemas may be altered by CT in ways that reduce risk for relapse and increase an individual's confidence in his or her ability to play an active role in life.

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Table 1

Between-Group Core Beliefs (EMS) by Group Pre- and Post-Treatment

Core Belief Domain	CT+PT		PT	
	Pre-Treatment	Post-Treatment	Pre-Treatment	Post-Treatment
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Disconnection	2.69 (0.90)	1.96 (0.73)	3.15 (0.80)	2.62 (0.91)
Impaired Autonomy	2.66 (0.84)	2.10 (0.96)	2.56 (0.68)	2.20 (0.74)
Exaggerated Standards	3.60 (1.21)	2.98 (1.14)	3.78 (0.96)	3.54 (0.87)
Impaired Limits	3.00 (1.03)	2.30 (0.78)	2.78 (0.78)	2.58 (0.89)

Table 2

Between-Group Attribute Redundancy Scores Pre- and Post-Treatment.

	CT+PT		PT	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Interpersonal positive	.51 (.13)	.66 (.16)	.45 (.11)	.46 (.15)
Interpersonal negative	.30 (.12)	.27 (.15)	.26 (.10)	.26 (.13)
Achievement positive	.34 (.10)	.45 (.17)	.27 (.15)	.32 (.14)
Achievement negative	.29 (.19)	.24 (.18)	.27 (.13)	.25 (.14)