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EMPIRICAL PAPER

Self-system therapy for distress associated with persistent low back pain: A randomized clinical trial

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Abstract

Objective: Persistent low back pain (PLBP) is associated with vulnerability to depression. PLBP frequently requires major changes in occupation and lifestyle, which can lead to a sense of failing to attain one's personal goals (self-discrepancy). **Method:** We conducted a clinical trial to examine the efficacy of self-system therapy (SST), a brief structured therapy for depression based on self-discrepancy theory. A total of 101 patients with PLBP and clinically significant depressive symptoms were randomized either to SST, pain education, or standard care. **Results:** Patients receiving SST showed significantly greater improvement in depressive symptoms. Reduction in self-discrepancy predicted reduction in depressive symptoms only within the SST condition. **Conclusions:** Findings support the utility of SST for individuals facing persistent pain and associated depression.

Keywords: self-system therapy; self-discrepancy; self-regulation; depression; persistent pain

Persistent low back pain (PLBP) affects more than five million Americans (Bell, Kidd, & North, 1997) and, for many individuals, is both physically and psychologically disabling (Waddell & Turk, 2001). Individuals who experience persistent pain often need to significantly modify their lifestyle in order to control and minimize their pain. For example, persons who have engaged in physically demanding occupations often find that they are unable to continue working or must change careers or otherwise give up important and valued activities because such behaviors exacerbate their pain. Not surprisingly, such changes are often as distressing as the pain itself (Snelgrove & Liossi, 2013).

With such changes in occupation and/or lifestyle comes significant alterations in one's ability to attain

personal goals and to maintain personal standards (Risdon, Eccleston, Crombez, & McCracken, 2003; Vowles, McCracken, & Eccleston, 2007). As a result, individuals with persistent pain frequently develop a perceived discrepancy between the kind of person they believe they have become (adversely affected by their pain) and the kind of person they ideally would like to be or believe they ought to be. These perceived self-discrepancies have significant affective and motivational consequences because they represent a breakdown in self-regulation—the ongoing process of evaluating and regulating one's behavior in reference to attaining important personal goals (Kocovski & Endler, 2000).

Converging lines of evidence suggest that chronic failure in personal goal pursuit increases risk for

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depression. Beginning with the seminal work of Akiskal and McKinney (1975), researchers have proposed that depressive episodes can be triggered by diminished availability of positive reinforcement in the environment as well as diminished positive affect associated with a lack or loss of those reinforcers (Akiskal & McKinney, 1975; Street, Sheeran & Orbell, 1999, 2001). Certain cognitive models of depression (e.g., Abramson, Metalsky, & Alloy, 1989), though not expressed in self-regulation terms, were consistent with the prediction that depression results from chronic failure to attain desired outcomes, and more recent models (e.g., Strauman, 2002) also suggest that self-regulation mediates the effects of a number of variables (e.g., genetic, physiological, cognitive, behavioral, and environmental) on vulnerability to depression.

Karoly (1999) proposed that “symptoms of psychopathology such as depression may be explained, at a motivational level, as the consequences of disordered self-regulation and goal guidance” (p. 278) and postulated that dysfunctional goal systems represent a “final common analytic pathway” (p. 264) for understanding depression. When individuals come to believe that they are unable to be the kind of person they want to be (or the kind of person that significant others want them to be), they become increasingly vulnerable to dysphoric affect and associated changes in physiology, motivation, and self-efficacy (Strauman, 2002). Thus, self-regulation models provide a parsimonious account of vulnerability to depression among patients with persistent pain and suggest that interventions which reduce perceived actual-self/desired-self-discrepancy should reduce dysphoric affect and other symptoms of depression (Strauman et al., 2001).

PLBP and Psychological Distress

The prevalence of depression in individuals with persistent pain ranges from 30% to 50% (Kroenke et al., 2012). Although depression is frequently diagnosed among people who live with persistent pain, research suggests that certain types of persistent pain conditions (i.e., neck-back pain and hip pain) are more likely to be associated with depression than others (e.g., rheumatoid arthritis, osteoarthritis; Linton, 2000; Reichborn-Kiennerud et al., 2002; Rusu, Pincus, & Morley, 2012). Thus, adjusting to persistent pain may contribute to depression, so that psychosocial interventions for persistent pain patients should not only address depression per se, but also those factors that hinder patients’ ability to effectively cope with their pain.

Self-discrepancy in Depressed Persistent Pain Patients

Under normal circumstances, an acute failure to achieve an important goal leads to transient negative affect that serves the adaptive purpose of increasing motivation to pursue the goal (Carver & Scheier, 1998). Regulatory focus theory (Higgins, 1997), the successor to self-discrepancy theory, proposes that individuals use two general strategies to pursue positive outcomes including attainment of important personal goals: by “making good things happen” (which the theory calls *promotion goals*) or by “keeping bad things from happening” (*prevention goals*). When individuals experience a promotion failure, they feel sadness, disappointment, and frustration; when people experience a prevention failure, they feel anxious, tense, and apprehensive. Individuals with persistent pain, however, often experience repeated or chronic failure to achieve important goals and as a result often develop a sense of powerlessness and subsequent loss of motivation to pursue these goals (Karoly et al., 2008; Viane, Crombez, Eccleston, Devulder, & De Corte, 2004). For example, individuals with PLBP often minimize activity in effort to prevent pain flares (i.e., prevention goals). However, in the process, they tend to give up the very activities that bring them pleasure and a sense of accomplishment (i.e., promotion goals). As a result, many patients with PLBP find themselves becoming dejected and frustrated, setting in motion a downward cycle in which failure to accomplish goals leads to depression which in turn increases self-discrepancies and also impairs self-regulation efforts leading to more depression as well as heightened pain and disability. Research suggests that such trait and behavioral self-discrepancies are important factors related to depression in both non-pain populations (Higgins, Bond, Klein, & Strauman, 1986; Strauman & Kolden, 1997) and in populations suffering from persistent pain (Waters, Keefe, & Strauman, 2004). Taken together, these observations suggest that pain management regimens may be more effective if they also target personal goal pursuit and the underlying self-discrepant beliefs that may be contributing to depressive symptoms.

Self-system Therapy (SST) as a Treatment for Depression in PLBP Patients

SST translates the principles of self-discrepancy theory and self-regulation theory (e.g., Higgins, 1997) into an intervention organized around re-establishing the motivation to pursue promotion-focused goals and behaviors, particularly among individuals with a strong promotion regulatory focus style (Vieth et al., 2003). SST is also useful in alleviating depression

among individuals with a prevention regulatory focus style through a reduction in distress-related anxiety levels (see, Clark & Watson, 1991). Research has shown that self-discrepancies arising from failure to achieve both promotion-focused and prevention-focused goals are associated with increased depression levels among patients with PLBP (Waters et al., 2004), suggesting that SST may be beneficial in reducing depression in this population.

The purpose of this study was to examine the efficacy of a 12-session SST protocol, adapted from the original SST protocol (Vieth et al., 2003), in reducing depression, disability, and self-discrepancies in patients with PLBP. Our model for applying SST to patients with persistent pain is drawn from the extensive description of SST techniques for depressed patients reported by Vieth et al. (2003). The current study tested the hypothesis that a version of SST designed to address the self-regulation problems experienced by depressed patients with PLBP would lead to greater improvement in depressive symptoms and self-discrepancies than either a pain education active-control condition or standard care condition. The study also tested the secondary hypotheses that participants receiving SST would report greater reductions in pain and disability compared to participants in the pain education and standard care conditions.

Method

Participants and Setting

Participants were 101 patients with PLBP (70% women; 62% European American; 10 years average pain duration) meeting DSM-IV criteria for a major depressive disorder recruited from the Duke Pain and Palliative Care Clinic in Durham, NC, a state where the prevalence of PLBP increased from 3.9% in 1992 to 10.2% in 2006 (Freburger et al., 2009). Criteria for entry into the study included: (i) age greater than 20 years; (ii) daily pain for six months or longer, i.e., meeting the generally accepted definition of PLBP; and (iii) a minimum Beck Depression Inventory (BDI) score of 18 at the time of randomization. Exclusion criteria included: (i) past or current diagnoses of schizophrenia, bipolar I or II affective disorder, organic brain syndrome, somatization disorder, antisocial or borderline personality disorders, or schizotypal features; (ii) diagnosis of alcoholism or drug use disorder within the past five years; (iii) hallucinations, delusions, or paranoid ideation; (iv) concurrent medical disorders that may cause depression (e.g., epilepsy, endocrine disease) or having other known organic diseases that would significantly affect function (e.g., COPD, diabetes); (v) substantial evidence of intellectual impairment based on clinical

interview; (vi) degree of suicidality requiring hospitalization; and (vii) inability to speak English. In addition, patients with pending litigation or in the process of seeking disability benefits were excluded from the study. Note that prior or current use of antidepressant medication was not grounds for exclusion, since most patients with PLBP who are depressed are prescribed tricyclic or selective serotonin reuptake inhibitor antidepressants for depression and pain control (Jann & Slade, 2007).

All patients were provided standard care for PLBP according to the 1997 practice guidelines for the management of persistent pain developed by the American Society of Anesthesiologists Task Force on Pain Management (1997). These guidelines recommend a comprehensive examination, providing basic information about pain and pain management, ongoing use of adjuvant analgesics (including antidepressant medications), coordination of care, and ongoing and periodic monitoring and measurement of clinical outcomes. They also recommend use of opioid therapy and nerve blocks (when indicated). Each patient was reimbursed \$30 for completing the pre-treatment and post-treatment evaluations.

Experimental Design

Patients who met eligibility requirements were randomly assigned to one of three treatment conditions: (i) SST; (ii) Low Back Pain Education (LBPE); or (iii) Standard Care Control (SCC). Table I presents the sample characteristics by condition. During the treatment phase of the study, all patients in the SST and pain education conditions were scheduled for 12 individual weekly sessions over a period of 16 weeks. All patients in the study continued to receive the standard medical care provided to depressed patients with PLBP. Patients in the SST condition received a treatment regimen designed to help them reduce self-discrepancy and improve personal goal attainment. Patients in the LBPE condition received detailed information on the nature of low back pain, treatment methods, exercises, and methods for maintaining mobility and function. Patients in the SCC condition continued to receive the standard medical care provided to depressed patients with PLBP but did not receive any additional intervention focused on either depression or pain management. Figure 1 summarizes the flow of patients through the study.

Interventions

Self-system therapy. SST (Strauman et al., 2006; Vieth et al., 2003) is a brief structured therapy designed for depressed individuals who are experiencing difficulties pursuing promotion goals. Vieth et al.

Table I. Sample characteristics by treatment group.

	SST (N = 28)	Education (N=37)	Standard care (N = 36)	Total (N = 101)
<i>Age</i>	53.07 (10.92)	54.62 (12.45)	53.64 (11.28)	53.84 (11.53)
<i>Duration of Pain (years)*</i>	14.21 (11.70) ^a	8.51 (7.03) ^b	8.79 (6.52) ^b	10.19 (8.71)
<i>Education</i>				
Some High School	3.6% (n = 1)	13.5% (n = 5)	5.6% (n = 2)	7.9% (n = 8)
High School Diploma	17.9% (n = 5)	21.6% (n = 8)	25.0% (n = 9)	21.8% (n = 22)
Some College	50.0% (n = 14)	13.5% (n = 5)	27.8% (n = 10)	28.7% (n = 29)
College degree	17.9% (n = 5)	24.3% (n = 9)	27.8% (n = 10)	23.8% (n = 24)
Graduate Education	10.7% (n = 3)	24.3% (n = 9)	13.9% (n = 5)	16.8% (n = 17)
Unknown/Missing	–	2.7% (n = 1)	–	1.0% (n = 1)
<i>Gender</i>				
Men	35.7% (n = 10)	29.7% (n = 11)	25.0% (n = 9)	29.7% (n = 30)
Women	64.3% (n = 18)	70.3% (n = 26)	75.0% (n = 27)	70.3% (n = 71)
<i>Race</i>				
European American	64.3% (n = 18)	56.8% (n = 21)	66.7% (n = 24)	62.4% (n = 63)
African American	28.6% (n = 10)	40.5% (n = 15)	30.6% (n = 11)	35.7% (n = 36)
Other	–	2.7% (n = 1)	2.8% (n = 1)	2.0% (n = 2)
<i>Married</i>	60.7% (n = 17)	56.8% (n = 21)	52.8% (n = 19)	56.4% (n = 57)

Note. Differing superscripts indicate statistically significant difference between groups.

* $p < .05$.

(2003) provided an extended presentation of the rationale, structure, and interventions that make up the core of SST. Although incorporating techniques from a number of empirically supported psychotherapies (cf., Beutler, Clarkin, & Bongar, 2000), including cognitive therapy (CT; Beck, Rush, Shaw, & Emery, 1979) and interpersonal therapy (Klerman, Weissman, Rounsaville, & Chevron, 1984) SST is unique in that behavioral pain management techniques (e.g., behavioral activation, self-evaluation skills, and goal-setting skills) are presented within an integrative conceptual framework that focuses on self-regulation and its role in maintaining depression (Strauman et al., 2006). For example, in SST behavioral activation is used in the service of enhancing pursuit of promotion-focused goals—that is, “What can you do today that would help you make progress toward that goal?”

Treatment sessions for SST were conducted by Ph.D. psychologists and pre-doctoral psychology interns (under the supervision of a senior licensed clinical psychologist), all of whom had prior experience with cognitive-behavioral interventions for managing depression and pain. Patients were scheduled for 12 weekly 90-minute individual treatment sessions conducted over a period of 16 weeks. The protocol for the present study was adapted by the authors from the 16-session depression treatment protocol used by Strauman et al. (2006) in their randomized trial. The session time was extended from 50 minutes to 90 minutes to allow for mid-session breaks during which patients were able to stand or stretch to alleviate pain or stiffness. Behavioral techniques for coping with pain were also provided during the extended sessions. The number of sessions was changed from

16 to 12 in order to reduce the number of separate visits needed, thereby decreasing participant burden, while still providing an adequate dose of the therapy.

Sessions 1 through 3. The first three sessions represented the *orientation* phase of SST. The patients were provided with a rationale for treatment that focused on the importance of self-regulation for well-being. The primary tasks of the first three sessions were the *self-in-context assessment*. This assessment involved (i) an examination of the patient’s significant relationships to identify the individual’s current and historical promotion- and prevention-focused goals and (ii) the initial formulation of specific goals for treatment. A historical promotion-focused goal identified in this phase might be participation in a specific family activity that promoted a sense of family cohesiveness. A current prevention-focused goal identified in this phase might be the reduction or cessation of participation in a specific family activity to prevent exacerbation of pain. A new, viable goal would be formulated that focused on promoting a greater sense of family involvement.

Sessions 4 through 7. The next four sessions constituted the *exploration* phase of SST. This phase consisted of (i) *psychological situation analysis*, in which patients examined successful and unsuccessful everyday interpersonal interactions and identified how their self-evaluations and promotion- and prevention-goal pursuit strategies were involved in good or bad outcomes, (ii) *self-belief analysis*, in which patients identified and analyzed their preferences for promotion- vs. prevention-focused goals based on past outcomes, and (c) the therapist and patient jointly revised the

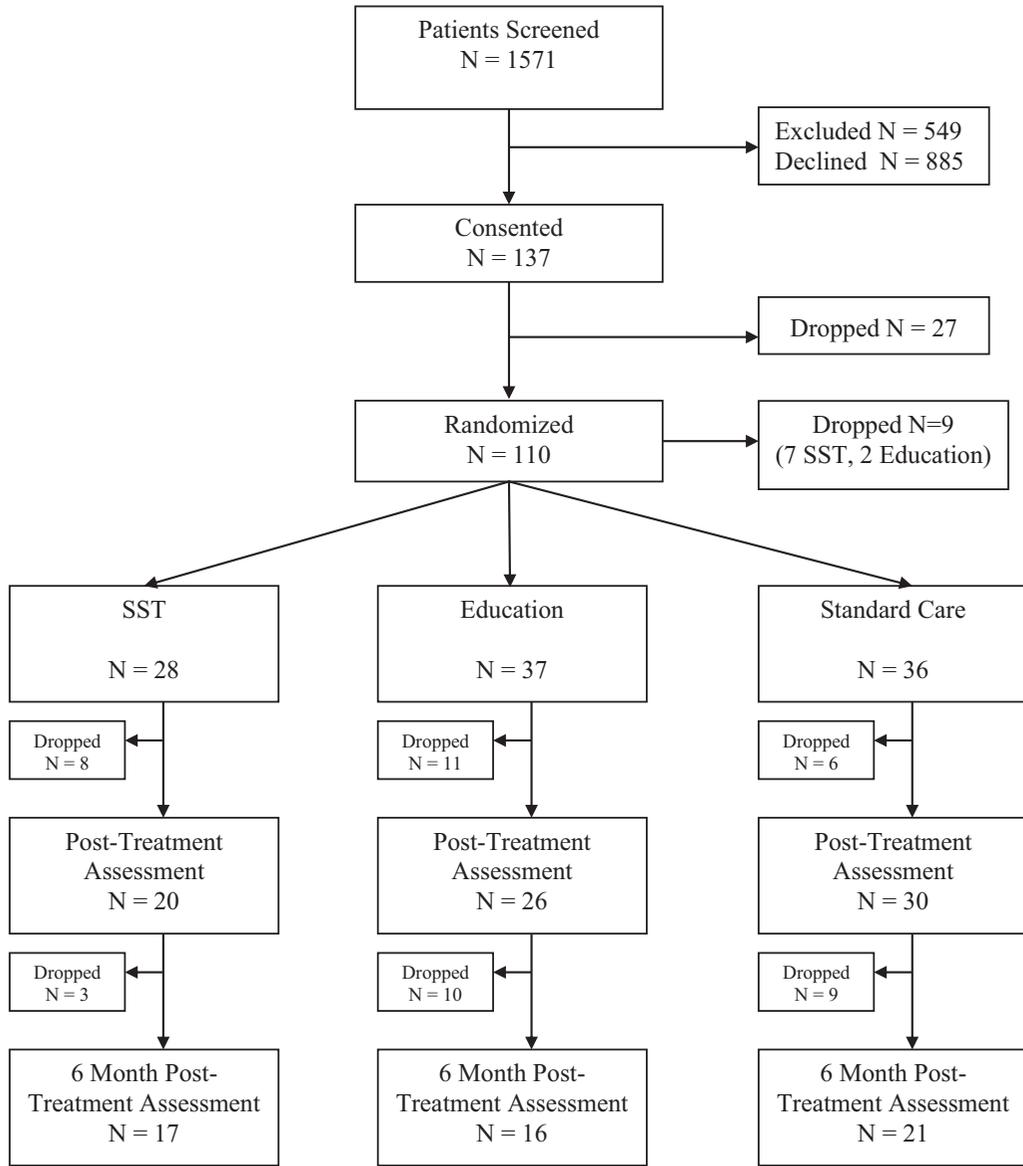


Figure 1. Flow chart of study participants.

initial treatment goals in order to prioritize promotion-focused behaviors over prevention-focused behaviors.

Sessions 8 through 11. The next four sessions made up what is known as the *adapation* phase of SST. In these sessions, the patient and therapist worked together to address each treatment goal, using compensatory strategies that involved helping the patient to modify goals or to learn to pursue them via different means that are a better fit to their current life circumstances, physical limitations, or personality traits. As in other brief therapies, the process of change was initiated during the treatment, with the expectation that after the treatment was concluded the patient would continue to make progress toward the realization of each treatment goal.

Session 12. In the final session, a maintenance plan was developed with each patient. The maintenance plan included a list of strategies to be used daily (e.g., self-monitoring forms), short-term goals (e.g., becoming more active in family activities) and long-term goals (e.g., engaging in community service activities). The importance of regular practice of learned skills in the maintenance of treatment gains was emphasized.

SST adherence and quality. To ensure the quality and integrity of SST as delivered, therapists followed a detailed manual and each treatment session was audiotaped. The audiotapes were reviewed by a supervising clinical psychologist and feedback based on session audio tapes was provided to therapists during weekly supervision meetings.

Low back pain education. The LBPE sessions used a presentation and discussion format similar to a format used by Moore, Von Korff, Cherkin, Saunders, and Lorig (2000) educational/informational protocol for low back pain. Charts and discussion sessions centered on presenting information on: (i) Nature of Chronic Low Back Pain; (ii) How Chronic Low Back Pain is Diagnosed; (iii) Treatment of Chronic Low Back Pain; and (iv) Techniques to Prevent Exacerbation of Chronic Low Back Pain. To ensure the quality and integrity of the LBPE intervention, treatment sessions for the LBPE condition were conducted by nurses having experience in educational interventions for managing depression and pain. In addition, a detailed LBPE manual suitable for use in clinical trials was developed and used by the nurses to ensure uniformity of procedures. Finally, each LBPE session was audiotaped and feedback was provided by a clinical psychologist on a weekly basis.

Standard care control. The SCC condition was designed to serve as a routine treatment control. Patients assigned to SCC condition continued to receive their routine care. Patients in the standard care condition completed all measures at time intervals corresponding to the beginning and ending of the treatment period.

Therapists

The same set of five therapists provided treatment in both the SST and LBPE conditions. Two were post-doctoral fellows in clinical psychology and the other three were licensed clinical psychologists holding faculty positions. Given the small number of therapists involved and the limited sample size of the study itself, we chose to examine potential therapist effects on the outcome variables by first using descriptive statistics to determine whether any possible differences of interest were observed and then conducting an omnibus fixed-effects analysis of variance (ANOVA) examining treatment, therapist, and treatment \times therapist interactions (Baldwin & Imel, 2013).

Measures

Outcome measures. A set of measures of depression, pain, and psychosocial and physical disability were collected during evaluation sessions carried out before and after the treatment phase of the study and at a six-month post-treatment evaluation.

Depression. The BDI (Beck & Steer, 1987) is a 21-item self-report inventory which assesses current degree of depressive symptomology through items pertaining to cognitive, affective, motivational, and physiological areas of depressive symptomology.

Total scores range from 0 to 63, with higher scores indicating greater depressive symptoms reported. The BDI has an internal consistency estimate of .86, test-retest correlations ranging from .48 to .86 for varying time intervals, and strong support for the construct validity of this measure. The applicability of the BDI to patients with persistent pain has been demonstrated (Turner & Romano, 1984).

Pain. Pain intensity was measured by computing the average of usual pain and worst pain in the past week rated on a 1–10 numeric rating scale whose end points were 1 = no pain, 10 = pain as bad as it can be. Numeric rating scales have shown strong evidence of reliability and validity in prior research (Childs, Piva, & Fritz, 2005; Jensen, Turner, Romano, & Fisher, 1999).

Psychosocial and physical disability. Psychosocial disability and physical disability were assessed using the Roland–Morris Disability Questionnaire (RDQ; Roland & Morris, 1983). The RDQ was derived from the Sickness Impact Profile (Bergner, Bobbitt, Carter, & Gilson, 1981; Follick, Smith, & Ahern, 1985) for use in self-report assessment of physical and psychosocial disability due to low back pain. The RDQ is a 24-item questionnaire that asks patients to check items that apply to them on that particular day. Scores on the RDQ are the total number of items checked. An internal consistency of .93 (Roland & Fairbank, 2000) has been found for the RDQ and use of the RDQ in back pain patients has been validated in other research (Garratt, Moffett, & Farrin, 2001; Pincus, Burton, Vogel, & Field, 2002).

Statistical Analyses

Statistical power calculations for this study were based on procedures described by Hedeker, Gibbons, and Waternaux (1999) for determining power in group-based longitudinal studies with attrition. Our initial power estimates assumed a 20% attrition rate and a two-tailed α of 0.05. The intent-to-treat sample ($N = 101$) provided a power of 0.80 to detect a standardized effect size of $r = .5$ and a power of 0.64 to detect a standardized effect size of $r = .3$.

All analyses were conducted using SAS version 9.2 (SAS Institute, USA). Significance tests were based on a two-tailed α of 0.05. Treatment groups were compared on baseline characteristics using ANOVA for continuous measures, χ^2 for categorical measures, and Fisher's exact tests for dichotomous measures. A series of mixed models was conducted to evaluate post-treatment and six-month follow-up effects of treatment conditions relative to baseline. Initial values of each predictor variable were mean

centered. For each outcome variable, we conducted a-priori omnibus analyses to identify overall statistically significant effects and then conducted post hoc comparisons between SST and the other two conditions. The post-treatment assessment for individuals in the standard care condition was conducted on the same schedule as the SST and LBPE conditions.

Analyses were conducted three ways to ensure that findings were not speciously influenced by choice of analytic strategy. First, time was entered into each model as a linear factor coded 0 (pre-treatment), 1 (immediate post-treatment), and 2 (six-month post-treatment). The intent of this analytic strategy was to determine whether change in any of the outcome variables was observed either immediately after completion of treatment or six months later (e.g., the possibility that change in mood might occur more quickly than change in pain perception). In a second set of analyses, time was coded as 0 for pre-treatment and as the number of weeks post-baseline that the immediate and six-month post-treatment assessments were obtained for each individual patient. In a third set of analyses, time was entered as a categorical variable. All three analyses returned similar findings, so results of the analyses using the first of the three analytic strategies are reported below.

Missing Data

Examination of the data-set did not reveal a pattern within the missing data. Approximately 0.5% of the data were missing (i.e., approximately 0.5% of cells in the overall data-set spreadsheet did not contain quantitatively meaningful values). Using PROC FREQ, PROC MEANS, and PROC MI in SAS we concluded that data were missing at random at the data-set and variable levels. The most common cause for missing data was a failure on the part of the participant to complete a particular questionnaire item on a given day. Missing data were imputed where necessary using multiple imputation (MI) based upon fully conditional Markov chain Monte Carlo (Schafer, 1987) modeling. Predictor variables were imputed using the other predictor variables included in our data analytic models (see below); outcome variables were imputed using the other outcome variables to avoid contamination between predictors and outcome variables within the imputation process. The final analysis model was based upon the averaged values of 100 separate imputations (Rubin, 1987).

Results

Although 110 participants were randomized, nine participants dropped out prior to the start of treatment and had limited available data even for baseline measures. Therefore, intent-to-treat analyses were con-

ducted with the 101 participants who were randomized to a treatment condition and at minimum provided baseline data. The results of analyses conducted on data from only those participants who completed the study did not differ from intent-to-treat analyses.

Analysis of Pre-treatment Differences among Groups

Table I summarizes the demographic variables for the 101 patients randomized to each treatment condition and included in outcome analyses. Statistically significant differences in pain duration were reported with the SST group having longer pain duration compared to the LBPE and SCC groups. Although education levels were not significantly different, the percentage of college degrees was twice as high in the LBPE group as in the SST group.

Treatment Participation

Comparison of treatment participation/compliance found no statistically significant differences in the number of sessions completed by the SST and LBPE groups ($M_{SST} = 8.57(4.91)$ vs. $M_{LBPE} = 9.20(4.43)$) or patients' ratings of treatment credibility ($M_{SST} = 37.65(8.61)$ vs. $M_{LBPE} = 34.31(11.00)$); see Table II). Although differences between the SST and LBPE conditions in terms of the total number of weeks in treatment ($M_{SST} = 13.93(9.62)$ vs. $M_{LBPE} = 10.50(6.68)$) were not statistically significant, on average the SST group required approximately an additional month to complete a similar number of sessions. That is, whereas the SST group received a nonsignificantly greater average number of sessions, the duration of treatment (in calendar days) was approximately 21 days longer on average for the SST group. In the outcome analyses reported below, neither number of sessions nor duration of treatment in days (run separately given their high covariation) was a significant independent or interactive predictor of any outcome variable.

Analyses of Treatment Effects on Outcome Measures

Table III presents summary statistics on all outcome variables by treatment condition at three time points: pre-treatment, immediate post-treatment,

Table II. Intervention information by treatment group.

	SST (N = 28)	Education (N = 37)
Total sessions completed	8.57 (4.91)	9.20 (4.43)
Total weeks in treatment	13.93 (9.62)	10.50 (6.68)
Treatment credibility	37.65 (8.61)	34.31 (11.00)

Note. For *t* tests, all *p* values > .25.

Table III. Means and standard deviations on outcome variables by treatment condition and time point.

	SST (<i>N</i> = 28)	Education (<i>N</i> = 37)	Standard care (<i>N</i> = 36)	Total (<i>N</i> = 101)
<i>Depression (BDI)</i>				
Initial	15.66 (7.04)	19.20 (7.06)	17.40 (7.89)	17.88 (8.27)
Post-treatment	10.72 (6.89)	16.47 (8.09)	16.08 (8.89)	14.33 (8.15)
Six-month follow-up	11.75 (6.70)	17.05 (9.06)	15.60 (8.02)	14.49 (8.21)
<i>Roland Morris Disability</i>				
Initial	15.26 (4.68)	16.51 (4.41)	16.48 (3.74)	16.16 (4.25)
Post-treatment	14.61 (5.90)	16.00 (6.10)	15.99 (4.12)	15.65 (5.29)
Six-month follow-up	13.60 (7.03)	15.00 (5.83)	14.51 (5.27)	14.39 (5.90)
<i>Pain Intensity</i>				
Initial	7.11 (1.71)	6.45 (1.80)	6.30 (1.73)	6.71 (1.76)
Post-treatment	7.19 (1.72)	7.28 (2.25)	6.83 (2.08)	7.08 (2.04)
Six-month follow-up	6.94 (2.14)	6.75 (2.09)	6.48 (1.92)	6.70 (2.01)

and six-month follow-up. ANOVA detected no statistically significant differences in baseline values for the outcome measures among the three conditions. Nonetheless, each of the models examining trends over time for the outcome variables included an estimated intercept component.

Table IV summarizes the analyses for each outcome variable. We began with a-priori tests of a linear trend for Time, an overall effect of Treatment Condition (i.e., across time), and a Time \times Treatment Condition interaction. Any statistically significant interaction was then probed using *post hoc* comparison *F* tests which contrasted the linear slope for the SST condition with the slope of each of the other two conditions. For depression a main effect of Time was observed, $F(1, 95) = 5.09$, $p < .05$, which indicated a general trend for decreasing BDI scores over time. This main effect was qualified by a Time \times Treatment Condition interaction, $F(2, 95) = 5.50$, $p < .05$. Post hoc testing indicated that the SST condition showed significantly greater reduction in BDI scores (standardized slope coefficient = -0.38) than the SCC condition (slope =

Table IV. Fixed effects for random slope/intercept models comparing treatment conditions.

	df	<i>F</i>	<i>p</i>	Effect size (R^2)
<i>Depression (BDI)</i>				
Time	1, 95	5.09	< .05	.08
Treatment Condition	2, 95	1.45	.25	.02
Time \times Treatment Condition	2, 95	5.50	< .05	.09
<i>Roland Morris Disability</i>				
Time	1, 95	12.25	< .01	.16
Treatment Condition	2, 95	0.35	.70	.00
Time \times Treatment Condition	2, 95	0.83	.44	.01
<i>Pain Intensity</i>				
Time	1, 95	0.77	.38	.01
Treatment Condition	2, 95	0.56	.57	.01
Time \times Treatment Condition	2, 95	1.75	.17	.03

-0.12), $p < .05$, and marginally greater reduction in BDI scores compared with the LBPE condition (slope = -0.19), $p < .07$. No statistically significant differences in pain or disability levels among the treatment conditions were identified. Analyses examining the usual pain and worst pain variables separately yielded the same results as the averaged score.

Change in Self-discrepancy by Treatment Condition

Table V presents mean scores for overall self-discrepancy by time point and treatment condition, along with a summary of the analysis for effects of Time, Treatment Condition, and their interaction. We observed a significant Time \times Treatment Condition interaction, $F(2, 95) = 3.50$, $p < .05$. Post hoc testing indicated that the SST condition showed significantly greater reduction in self-discrepancy (standardized slope coefficient = -0.41) than the SCC condition (slope = -0.06), $p < .05$, as well as the LBPE condition (slope = 0.14), $p < .05$.

Self-discrepancy as a Moderator of Treatment Outcome

We conducted an additional set of analyses examining change over time for each outcome variable, this time including baseline levels of self-discrepancy as a covariate in order to determine whether patients with different levels of self-discrepancy obtained differential benefit from treatment per se or from a specific treatment condition. We did not observe any statistically significant effects involving overall self-discrepancy at baseline as a moderator on any outcome variable.

Does Change in Self-discrepancy Predict Improvement in Depressive Symptoms?

We conducted a hierarchical linear analysis in which we sought to determine whether change in

Table V. Means and standard deviations on overall self-discrepancy by treatment condition and time point, plus fixed effects for random slope/intercept model comparing treatment conditions.

	SST (N = 28)	Education (N = 37)	Standard care (N = 36)	Total (N = 101)
Initial	0.08 (1.12)	-0.12 (1.44)	-0.49 (1.36)	-0.24 (1.32)
Post-treatment	-0.46 (1.04)	-0.09 (1.56)	-0.30 (0.99)	-0.26 (1.19)
Six-month follow-up	-0.62 (1.42)	0.72 (1.51)	-0.58 (1.40)	-0.29 (1.44)
	df	F	p	Effect size (R ²)
Time	1, 95	0.90	.65	.01
Treatment Condition	2, 95	1.02	.48	.02
Time × Treatment Condition	2, 95	3.50	< .05	.06

self-discrepancy across the three time points predicted change in depressive symptoms, either within or across the treatment conditions. We found a significant Treatment Condition effect, $F(2, 95) = 3.79, p < .05$. The association between reduction in self-discrepancy and reduction in depressive symptoms was statistically significant within the SST condition ($\beta = 0.42$) but not within the LBPE condition ($\beta = .01$) or the SCC condition ($\beta = .18$).

Were Therapist Effects Observed?

Examination of descriptive statistics revealed no obvious therapist differences on outcome variables. For example, mean BDI scores at pre-treatment, post-treatment, and six-month follow-up for the five therapists (combining across the two active treatment conditions) were: Therapist 1, means = 17.7, 14.1, and 14.8; Therapist 2, means = 17.9, 15.1, and 15.1; Therapist 3, means = 18.4, 15.0, and 15.1; Therapist 4, means = 16.9, 14.0, and 14.9; and Therapist 5, means = 17.2, 15.0, and 15.1. We then conducted exploratory fixed-effects repeated-measure ANOVAs for each of the three outcome variables, with Time (3) as a within-subject factor and both Treatment Condition (2) and Therapist (5) as between-subject factors. These analyses identified no statistically significant main effects for therapist (all $p > .25$) or Therapist × Treatment Condition interaction (all $p > .5$). Given that the study was underpowered for exploring therapist effects alongside and within treatment effects, we took these null findings in the exploratory analyses as indications that there was no basis for incorporating Therapist as a variable in our primary outcome analyses for the study (as reported above).

Discussion

This study is the first to examine the efficacy of SST in reducing depression among individuals with PLBP. The results of mixed-model analyses provided support for our hypothesis that SST would reduce depression levels among patients with PLBP. Patients

who received SST reported less depression both at post-treatment and six months after completion of the study compared to patients in the LBPE and SCC conditions. These findings remained after accounting for pre-treatment depression levels and without controlling for the older age and longer pain duration of patients in the SST group compared to the other two conditions. The findings of the study are important because they show that reductions in depression among patients with PLBP can be sustained over time using an intervention that emphasizes personal goal pursuit rather than pain management.

Many treatments for depression among PLBP patients are designed using a biopsychosocial approach, recognizing that pain, cognitions, emotions, and social/environmental factors may contribute to depressive symptoms among this patient population (Campbell, Clauw, & Keefe, 2003). The emphasis in these therapies is on pain management. For example, with cognitive behavioral therapy (CBT), patients learn to modify behaviors in order to prevent pain flares and learn to alter pain-related cognitions that negatively impact pain management (Waters, Campbell, Keefe, & Carson, 2004). The goal of CBT is to increase patients' management of their pain, subsequently improving daily life and reducing depressive symptoms. While successful in reducing pain-related depression levels, these therapies do not directly address changes in self-regulation also associated with depression. As the results of our study suggest, SST is effective in reducing depression associated with the self-regulation process independent of any effect on the chronic pain itself.

The focus of SST is on explaining to individuals how the type of goals they set for themselves can impact their self-beliefs and their psychological well-being and, then, helping them learn (or relearn) how to set goals that promote a sense of growth or accomplishment (Vieth et al., 2003). For patients with PLBP, this means reallocating resources from preventing pain to creating goals that will increase feelings of self-worth. In the present study, using SST patients were taught how to identify and set goals that would promote personal growth in relevant life

domains (e.g., spouse or parent). For example, individuals who wanted to be more involved with their children would identify behaviors that would help them achieve that specific goal while instilling (re-instilling) a greater sense of purpose. Also, patients learned how to reformulate prevention-focused goals into promotion-focused goals (e.g., a goal of *avoiding pain* would become a goal to *participate in a specific event*). Within the context of identifying behaviors that would increase the likelihood of achieving specific goals, patients learned behavioral techniques for managing pain used in CBT and other behavioral therapies. Because the study participants were patients with PLBP, incorporating behavioral pain management techniques into the SST protocol was necessary; yet, the emphasis of SST treatment techniques was on setting goals that would promote personal growth and accomplishment. For patients with PLBP receiving SST, it seems that the pursuit of promotion-focused goals may be as important as goal attainment.

In a study comparing SST to CT in a depressed non-pain population, Strauman and colleagues (2006) found that as promotion goal pursuit increased among individuals receiving SST, dysphoric responses to priming of promotion goals decreased. This finding suggests that engaging in promotion goal pursuit may reduce depression levels by reducing the amount and/or impact of negative cognitions and emotions associated with activation of thoughts about specific (often unattainable) goals. This idea is supported by the research of Jones, Papadakis, Hogan, and Strauman (2009) who found fewer depressive symptoms among individuals who were able to reflect, rather than ruminate, over their failure to achieve promotion-focused goals. In the Jones et al. (2009) study, promotion-focused goal failure was operationalized as the degree to which participants reported not having self-generated ideal traits. Differences between current attributes and both ideal (hoped-for) and ought (obligatory) attributes are also called self-discrepancies (Higgins et al., 1986). Thus, goal-regulation may be monitored through changes in self-discrepancies.

In the present study of patients with PLBP receiving SST, we found a significant reduction in self-discrepancies immediately after receiving SST. Six months later, the significant decline in self-discrepancies remained, with patients again reporting more congruencies than discrepancies. The shift from negative to positive self-evaluations suggests that SST was successful in helping patients with PLBP learn how to focus on identifying and pursuing goals that would foster a greater sense of individual growth and accomplishment. Identifying this link between SST

and self-discrepancies leads us to posit that self-discrepancies may be a mechanism through which SST operates. Future research examining self-discrepancies as a possible pathway through which SST impacts depression could significantly advance our understanding of self-regulatory processes in patients suffering from persistent pain and its emotional sequelae.

One limitation of the study involved the demographic profile of our participants. The study sample was well-educated and predominately European American and female, which may not accurately reflect the population of patients with PLBP. In order to generalize findings, further research should be conducted at multiple sites in order to reach a more representative sample of patients with PLBP. Another limitation that should be acknowledged is that the small number of therapists involved, and the sample size as a whole, did not provide ample opportunity for exploring possible therapist effects and therapist \times treatment interactions. Although the study hypotheses focused on treatment effects, it would be inappropriate to conclude that the role of the therapist is secondary; additional research should help to clarify this important issue. The study itself focused on a patient population that is not typical for psychotherapy outcome or process research. As such, the findings should be generalized with caution. Nonetheless, given the life challenges that individuals with chronic pain experience, we believe the findings are relevant to a broader range of patients and that many psychotherapists, including the readers of this journal, have patients whose medical conditions contribute significantly to their distress. The findings suggest that SST may be useful for depression in individuals with chronic pain and associated medical conditions, and that expanding psychotherapy research into nontraditional patient populations is both feasible and potentially informative.

Conclusion

Relatively few psychosocial protocols have been developed and tested in patients with PLBP. Yet, this is a patient population often frustrated by their inability to engage in life's activities and their loss of hope that their lives will, once again, be rewarding. The refinement of a psychosocial protocol that focuses on self-discrepancy in the context of self-regulation (such as SST) could represent a valuable addition to ongoing medical and psychological approaches to PLBP by enhancing chronic pain patients' personal goal pursuit and control over their depression, and psychological and physical functioning.

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