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Using problem solving therapy to treat veterans with subsyndromal depression: a pilot study

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Abstract

Objective—We conducted a pilot study comparing problem solving therapy for primary care (PST-PC) to a dietary education control condition in middle-aged and older veterans with symptoms of emotional distress and subsyndromal depression.

Methods—This was a two-site study at the VA Pittsburgh Healthcare System and Philadelphia VA Medical Center. Participants included veterans ≥ 50 years of age referred from primary care clinics who were eligible if they obtained a pre-screen score ≥ 11 on the Centers for Epidemiologic Studies Depression (CES-D) scale. Exclusions were a DSM-IV Major Depressive Episode within the past year, active substance abuse/dependence within 1 month, current antidepressant therapy, and a Mini mental status exam score < 24 . Participants were randomized to receive one of two interventions—either PST-PC or an attention control condition consisting of dietary education (DIET)—each consisting of six to eight sessions within a 4-month period.

Results—Of 45 individuals randomized, 23 (11 PST-PC and 12 DIET) completed treatment. Using regression models in completers that examined outcomes at end of treatment while controlling for baseline scores, there were significant differences between treatment groups in SF-36 mental health component scores but not in depressive symptoms (as assessed with either the 17-item Hamilton Rating Scale for Depression or the Beck Depression Inventory), social problem solving skills, or physical health status (SF-36 physical health component score).

Conclusions—These pilot study findings suggest that a six-to-eight session version of PST-PC may lead to improvements in mental health functioning in primary care veterans with subsyndromal depressive symptoms.

Keywords

depression; problem solving therapy; veteran; mental health functioning

Introduction

Problem solving therapy (PST) is an evidenced-based treatment that helps individuals with depression (e.g., as reported in a meta-analysis by Cuijpers *et al.*, 2007). By teaching depressed patients problem solving skills, patients learn to better manage day-to-day problems. It has been demonstrated that PST helps to improve depressive symptoms in individuals with major depression (Mynors-Wallis *et al.*, 1995; 2000). In addition, this therapy has been shown to be effective in improving depressive symptoms in patients with subsyndromal depression (Barrett *et al.*, 2001). Subsyndromal depressive disorders are common in primary care settings (Oslin *et al.*, 2006; Ross *et al.*, 2008). Subsyndromal depressive disorders generally include such disorders as dysthymia, minor depression, adjustment disorder with depressive symptoms or with mixed anxiety, and depressive symptoms.

Although no single approach to defining subjects with “less than major depression” has been universally accepted, the literature indicates that older individuals who are already symptomatic with subsyndromal depression are at high risk for developing major depression (Lyness *et al.*, 2006). PST has been shown to prevent depression in older adults with macular degeneration (Rovner *et al.*, 2007) and following stroke (Robinson *et al.*, 2008). There is also evidence that PST in the primary care setting (PST-PC) may improve depressive symptoms and functioning in older individuals with subsyndromal depression (Williams *et al.*, 2000). However, it is not known whether these results are generalizable to veterans; responses may be different in this population because veterans are known to have unique needs (Hobbs, 2008).

Problem solving therapy for primary care consists of six to eight sessions administered every other week. Mynors-Wallis *et al.*, (2000) demonstrated that PST-PC is equally effective whether administered by practice nurses, general practitioners, or mental health professionals. Alexopoulos *et al.* (2003) found evidence that the ability of depressed older individuals to use important components of PST-PC accounted for improvements in depression. Answering the question of whether PST-PC can improve depressive symptoms in middle-aged and older veterans with subsyndromal depression is important from a public health perspective. Effective interventions are needed to improve depressive symptoms and functioning in these individuals. In a pilot intervention, we hypothesized that PST-PC would improve depressive symptoms and functioning in middle-aged and older veterans with subsyndromal depression relative to an attention-only control condition consisting of dietary education (DIET). In addition, we explored whether PST-PC would improve social problem solving skills.

Methods

All subjects were recruited from primary care clinics at two large metropolitan hospitals to participate in a VISN 4 MIRECC-sponsored random assignment pilot trial to study the ability of PST-PC versus DIET to treat depressive symptoms in veterans with subsyndromal depression. Institutional Review Boards from both the VA Pittsburgh Health Care System and the Philadelphia VAMC approved the study.

Subjects were at least age 50 years with a Center for Epidemiologic Studies Depression (CES-D; Radloff, 1977) scale score ≥ 11 based on Reynolds *et al.* (2014). Exclusions were major depressive episode within the past year, active substance abuse/dependence within 1 month, current antidepressant therapy, and a mini mental status score < 24 (Folstein *et al.*, 1975). A score of 11 or greater on the CES-D without current major depression within the past year was our operational definition of subsyndromal depression. We collected demographic information and assessed depressive symptoms with the clinician-rated 17-item Hamilton Rating Scale for Depression (HRSD 17; Hamilton, 1960) and the self-report Beck Depression Inventory (BDI; Beck *et al.*, 1961). The HRSD 17 was administered by bachelor's or master's level research assistants who had been trained by the NIMH-sponsored Advanced Center for Late Life Depression Prevention and Treatment at the University of Pittsburgh School of Medicine. The intra-class correlation coefficient for the HRSD 17 was 0.815 based on Shrout and Fleiss (1979).

We assessed physical and mental health functioning with the Medical Outcomes SF-36 scale, a self-report measure of functional health status that assesses two dimensions (physical health and mental health); eight multiple subscales are used to determine both component scores (Ware *et al.*, 1994). Each of the two component scores differs as a result of the amount of weight that is assigned to each of the eight items. For example, for the mental health scale, a weight of 0.269 is used for the social functioning subscale; whereas for the physical component score, a weight of only 0.008 is used. In addition, we assessed problem solving skills with the Social Problem Solving Inventory (SPSI; D'Zurilla and Nezu, 1990). The SPSI is a 25-item, multidimensional, self-report measure developed with sound psychometric properties. The instrument assesses skills that are addressed by teaching patients the process of solving problems.

Interventions

The experimental group received manualized PST-PC (Nezu and Nezu, 2001; Hegel and Areán, 2003), which includes providing six to eight sessions to participants. The first session lasted an hour, and each subsequent session lasted 30 min each. Following the initial orientation session, each half hour session of PST-PC focuses on seven steps: (1) defining the problem; (2) setting a realistic goal; (3) "brainstorming" on potential solutions; (4) considering the advantages and disadvantages of each solution; (5) choosing the best solution; (6) developing an action plan; and (7) reviewing progress. In addition, during each session, participants are encouraged to discuss increasing enjoyable activities each day, known as "activity scheduling". Participants in the DIET group received coaching in healthy eating practices. Using a manualized educational intervention, interventionists reviewed general nutrition guidelines, including the US Department of Agriculture Food Pyramid,

helped with preparing weekly menus and grocery lists, saving food coupons, and reviewed food intake since last visit. The topics discussed included access to healthy food, cost of food, meal preparation, culturally specific and acceptable foods, and specific topics raised by participants.

Problem solving therapy for primary care and DIET had similar numbers of sessions (six to eight sessions each). Both interventions included homework assignments and monitoring of adherence, and both focused on concerns identified by each participant. Both interventions were provided by staff trained by the NIMH-sponsored Advanced Center for Late Life Depression Prevention and Treatment at the University of Pittsburgh School of Medicine; interventionists included two psychiatrists, three clinical psychologists, and four nurses (two clinical nurse specialists and two doctoral-level nurses). The same interventionists delivered both PST-PC and DIET, in order to avoid confounding intervention with clinician effects. The protocol was overseen by a Data Safety Monitoring Board.

Data analysis

Descriptive statistics for continuous measures are presented as means and standard deviations and as frequencies and percentages for categorical measures. For baseline assessments, when continuous measures were normally distributed, the parametric student's *t*-test was used to compare the intervention groups, and the nonparametric Mann–Whitney *U*-test was used when the measures were not normally distributed. For categorical measures, group comparisons were made using the chi-square test, and Fisher's exact test was used when expected cell sizes were less than five.

In order to compare the intervention groups on outcome measures, regression models of each outcome measure were estimated with intervention assignment and baseline assessment as independent variables; thus, the analysis compares endpoint to baseline values and controls for baseline values. A completers analysis was performed. We defined a “completer” as one who completed at least six sessions of PST-PC (if in the experimental group) or DIET (if in the control group) and also at least one of the outcome assessments; there were a total of 23 completers out of 45 randomized. All continuous measures were standardized in order to calculate Cohen's *d*. Because of an extremely non-normal distribution, the BDI was binned and modeled with cumulative logistic regression (McLachlan and Peel, 2000).

Results

A total of 18,571 individuals were screened (10,522 at Pittsburgh and 8049 at Philadelphia) from 4/2008 to 5/2011. At Pittsburgh, of 1238 patients noted to have a Patient Health Questionnaire Scale-2 score >0 in the VA Computerized Patient Record System, 577 appeared to meet inclusion criteria; letters were sent to these individuals from their primary care provider. The Patient Health Questionnaire Scale-2 is a scale that inquires about the frequency of depressed mood and anhedonia over the past 2 weeks; it includes the first two items of the Patient Health Questionnaire Scale-9 (Kroenke *et al.*, 2003). Fifty-six called in for a phone screen, and of those who had a CES-D score >11 , 32 signed informed consent. At the Philadelphia VAMC, 109 patients were identified by Behavioral Health Laboratory

screening using the CES-D criteria and referred to the study coordinator; 90 of these underwent phone screening; 47 of these signed the informed consent. Of the 79 patients at both sites who consented to the trial, a total of 45 were randomized.

Reasons for non-participation after consent included the following: (1) nine developing major depression; (2) three did not complete baseline testing; (3) two taking medications that were cause for exclusion; (4) three with a CES-D score <11 ; (5) five unable to come because of extenuating circumstances; (6) two were no-shows; (7) six decided they wanted usual mental health care; (8) one was lost to follow-up; and (9) three were unknown. Of the 45 participants who were randomized, 25 were randomized to PST-PC (13 at Pittsburgh and 12 at Philadelphia) and 20 were randomized to DIET (11 at Pittsburgh and 9 at Philadelphia). We defined a completer as one who completed at least six sessions of PST-PC and also at least one of the outcome assessments; there were 23 completers out of those randomized. Reasons for the 45 randomized not being a completer included the following: (1) one developing major depression (in DIET); (2) five not completing assessments (four in PST-PC and one in DIET); (3) four lost to follow-up (two in PST-PC and two in DIET); (4) two deciding they did not want DIET; (5) one deciding they wanted more intensive treatment (in DIET); and (6) nine not completing the treatment sessions (all in PST-PC: two of these stating they lost interest, one wanting to get paid for treatment, one being “too busy”, one stating “this was not for me”, one deciding he no longer had problems, and the other three gave no reason).

We also compared baseline characteristics of completers versus “non-completers”. Completers had lower BDI scores than non-completers at baseline (10.2 ± 5.2 vs. 14.4 ± 6.5 ; $U = 4.64$, $df = 1$; $p = 0.031$). There were no other differences with respect to age, race, education, marital status, history of major depressive episodes, or with the following baseline clinical measures: HRSD 17, SF-36 mental or physical component, SPSI, or MMSE scores. Of the 45 participants randomized, three were women, and they were all from the Philadelphia site; one was randomized to PST-PC and the other two were randomized to DIET. Only one of the women completed, and she was in the DIET group. The baseline demographic and clinical characteristics of those who completed are provided in Table 1. There were no significant differences between those completers who received PST-PC versus DIET with regard to age, race, education, marital status, history of major depressive episodes, or MMSE scores, BDI scores, Hamilton scores, SF-36 mental or physical component scores, or SPSI scores. Among completers, there were no significant differences between the number of treatment sessions in those receiving PST-PC (i.e., 7.0 ± 0.82) versus DIET (6.5 ± 0.52). Table 2 shows (baseline to endpoint) changes in scores on outcome measures, which include BDI, HRSD 17, SPSI, SF-36 mental, and physical component scores. There were significant differences in SF-36 mental component scores in the group receiving PST-PC group (baseline: 37.9 ± 12.1 ; endpoint: 51.3 ± 16.7) relative to the group receiving DIET (baseline: 46.3 ± 11.8 ; endpoint: 50.1 ± 8.5 ; $p = 0.0019$). However, there were no significant group differences between endpoint and baseline BDI, HRSD, SF-36 physical component, or SPSI scores.

Discussion

These pilot findings suggest that, in primary care Veterans with subsyndromal depression, PST-PC leads to significant improvements in self-reported mental health functioning. Our definition of subsyndromal depression was operationally defined as individuals having a score of 11 or greater on the CES-D scale. Furthermore, participants could not have had a major depressive episode within the past year, active substance abuse/dependence within 1 month, current antidepressant therapy, or antidepressant therapy during the trial.

We did not demonstrate significant improvements in depressive symptoms, and it is not clear why this was the case while we detected significant differences with the SF-36 mental health scores. We used the HRSD 17 and BDI as depression measures because they differ in the way they are administered. The HRSD 17 is clinician administered, and the BDI is self administered. Furthermore, we used the SF-36 because we wanted to assess levels of functioning. There was, however, overlap between the scales. For instance, the correlation between the HRSD 17 and BDI was $r = 0.73$, the correlation between the HRSD 17 and SF-36 mental health scores was $r = -0.59$, and the correlation between the BDI and SF-36 mental scores was $r = -0.65$. As might be expected, the correlations between the SF-36 physical scores and the HRSD 17 and BDI were lower; that is, $r = 0.08$ and $r = 0.12$, respectively.

Possible explanations for lack of significance with the HRSD 17 and BDI include small sample size or bias induced by drop outs. Also, the control group was more than a placebo because it included discussion about food and eating habits along with interventions that included homework assignments, monitoring of adherence, and focused on concerns identified by each participant. In addition, the HRSD 17 scale has been noted to not perform as well as other scales in detecting small changes especially in individuals with a low level of depression severity (Helmreich *et al.*, 2011). Those participants who did not complete the trial were more likely to have had a higher BDI score at baseline. However, there were no other differences in baseline demographics or clinical characteristics between those who were completers versus those who were non-completers. In addition, of those who consented, there were no differences in baseline demographics or clinical characteristics between those who were randomized and those who were not randomized. We did demonstrate that there was a medium effect size (although non-significant) favoring improvement of depressive symptoms with PST-PC. Medium effect sizes were demonstrated with both the self-report BDI and the clinician-administered HRSD 17. These findings are consistent with the significant improvements noted in participants' self-reported measures of functioning, and previous findings suggesting that the mental health component of the SF-36 may be useful in screening for depressive disorders (Silveira *et al.*, 2005).

Williams *et al.* (2000) treated a group of patients aged 60 years and older with minor depression or dysthymia with various interventions that included a PST-PC or a placebo intervention condition. The sample included veterans. Patients treated with PST-PC did not show greater improvement in depressive symptoms than placebo (difference in mean [standard error] on the Hopkins SCL-20 depression subscale, 0.11 [0.13]; $p = 0.13$); however, PST-PC patients showed more rapid improvement of depressive symptoms than

placebo patients. A recent trial of participants aged 50 years and older with subsyndromal depression compared PST-PC with a dietary educational intervention (Reynolds *et al* 2014 in press). After administering a series of six to eight sessions of either intervention, there were follow-up booster sessions every 6 months for a total follow-up time of 2 years. All participants in both groups improved in terms of depressive symptoms as assessed with the BDI. However, there were no group differences with regard to either outcome.

With regard to mental health functioning, in the Williams *et al.* (2000) trial, PST-PC (as contrasted with the placebo intervention) was not associated with improved mental health functioning. However, for a subgroup of patients with minor depression, PST-PC improved mental health functioning in patients in the lowest tertile of baseline functioning (difference vs. placebo in mean [standard error] change in SF-36 mental component scores, 4.7 [2.03]). This raises the question as to whether PST-PC is more likely to show an impact in those individuals who present lower levels of functioning. The fact that PST-PC in our study showed an effect limited to mental health functioning is not inconsistent with the findings of Williams *et al.* (2000). Together, the results of the two studies suggest that the intervention may improve mental health functioning. The positive effect on mental health functioning was greater in our study compared with that noted in the Williams *et al.* (2000) trial. One factor that could have accounted for these differing outcomes could be the difference in the number of sessions between the two trials. Patients in our trial had a minimum of six sessions. In the Williams *et al.* (2000) trial, 81.4% attended at least four treatment sessions, which they defined as the minimum number needed to test efficacy; 74.9% completed all scheduled treatment sessions.

There are few other reports that have examined whether psychosocial interventions are able to improve depressive symptoms in veterans with subsyndromal depression. Ross *et al.* (2008) randomized a group of veterans with subsyndromal depression to 8 weeks of telephone-based close monitoring versus treatment as usual and evaluated outcomes 6 months post randomization. They determined that there were significantly lower incidence rates of psychiatric diagnoses such as generalized anxiety disorder (14.3% in usual care [UC] vs. 9.6% with close monitoring [CM]) and post-traumatic stress disorder (15.7% in UC vs. 5.3% with CM). However, there were no differences noted with incidence rates of major depressive disorder (7.5% in UC vs. 8.6% with CM). In addition, the intervention group had improved in terms of overall physical health.

Limitations of the current study include small sample size and an appreciable drop-out rate; thus, bias may be an issue. The sample size was determined for a pilot trial. It enrolled available eligible subjects rather than being determined by anticipated effect size and power. Given the small sample size, the reliability of the estimate of the effect size is limited; the fact that there were medium effect sizes for the two depression outcomes suggests that the non-significant findings could be due to lack of power. We did not exclude persons with PTSD or serious comorbid physical problems. In addition, although we excluded individuals with a mini mental status score <24, it is possible that some of the participants with scores 24>= could have had a mild neurocognitive disorder. All three of these comorbidities, that is, PTSD, serious comorbid physical disorders, or mild neurocognitive disorders, may be associated with depression and could confound the findings. With this study, we were not

able to determine whether persons with PTSD, physical disorders and/or mild neurocognitive disorders, and subsyndromal depression respond the same way as persons with only subsyndromal depression. However, this would be an important question for future research with a larger sample.

Sixty percent of the PST participants dropped out, and 35% of the DIET participants dropped out. A possible reason for this is that PST may be psychologically demanding for veterans and it may need to be modified for this population to make it more acceptable. Furthermore, the trial included those that consented to participate in a research study. Also, it consisted mostly of men, and this could have affected the generalizability of the findings. The literature indicates that already symptomatic individuals with subsyndromal depression are at highest risk for developing major depression (Cuijpers *et al.*, 2004; Lyness *et al.*, 2006). Thus, it would be of interest to determine whether PST-PC is able to prevent incident rates of major depression in a larger sample size of veterans with subsyndromal depression.

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Key points

- In this pilot trial, PST in subsyndromally depressed veterans aged 50 years and older leads to significant improvements in mental health functioning.
- There were no significant differences with regard to scales assessing depression or social problem solving skills.
- There were many drop outs that could have biased the results.

Table 1

Demographic and clinical measures at baseline by intervention for completers

Measure	All (N= 23)	Intervention		Analyses				
		PST-PC (N= 10)	DIET (N= 13)	Test statistic	df	p	Effect size	Mag
Age	63.1 ± 9.7	64.8 ± 10.8	61.9 ± 9.0	$t = 0.67$	20	0.509	$d = 0.20$	Sm
Race/ethnicity				$P = 0.35$		0.615	$V < 0.01$	
Black	5 (27.8)	1 (16.7)	4 (33.3)					
White	13 (72.2)	5 (83.3)	8 (66.7)					
Education (years)	13.5 ± 2.5	13.9 ± 3.1	13.2 ± 2.1	$U = 0.65$	1	0.419	$\eta^2 = 0.03$	Sm
MMSE	27.5 ± 1.7	27.9 ± 1.8	27.2 ± 1.6	$t = 0.93$	21	0.362	$d = 0.28$	Sm
Married	10 (45.5)	5 (55.6)	5 (38.5)	$P = 0.25$		0.666	$V = 0.17$	Sm
History of MDD	8 (34.8)	3 (30.0)	5 (38.5)	$P = 0.31$		1.000	$V < 0.01$	
N treatment sessions	6.7 ± 0.70	7.0 ± 0.82	6.5 ± 0.52	$t = 1.93$	21	0.067	$d = 0.56$	Med

PST-PC, Problem Solving Therapy for Primary Care; DIET, dietary education; mag, magnitude; sm, small; MMSE, Mini Mental Status Exam; MDD, major depressive disorder; N, number; *df*, degrees of freedom; *t* refers to student's *t*-test; *P* refers to Fisher's exact test; *U* refers to the Mann–Whitney test; *p* refers to level of statistical significance; *V* refers to Cramer's *V*; *d* refers to Cohen's *d*; η^2 refers to effect size for ANOVA.

For continuous data, the data are reported as means ± standard deviation. For categorical data, we present numbers followed by percentages in parentheses.

Table 2

Outcome measures by intervention for completers

Measure	All (N= 23)	Intervention		Analyses					Mag ^b
		PST-PC (N= 10)	DIET (N= 13)	Test statistic	df	p	Effect size		
Baseline									
Beck Depression Inventory	9.7 ± 4.7	9.0 ± 4.0	10.2 ± 5.4	t = 0.54	18	0.594	d = 0.18		
Hamilton Rating Scale for Depression	10.5 ± 4.5	8.8 ± 3.5	11.6 ± 4.9	t = 1.40	18	0.178	d = 0.47	Sm	
Short form health survey: mental component	43.1 ± 12.3	37.9 ± 12.1	46.3 ± 11.8	t = 1.59	19	0.129	d = 0.50	Med	
Short form health survey: physical component	43.0 ± 10.5	47.6 ± 8.5	40.2 ± 11.0	t = 1.63	19	0.120	d = 0.53	Med	
Social Problem Solving Inventory	100 ± 13.1	98.7 ± 17.2	101 ± 10.0	t = 0.40	20	0.692	d = 0.12		
End of treatment ^a									
Beck Depression Inventory ^c	6.7 ± 5.3	4.8 ± 5.2	8.3 ± 5.0	χ ² = 0.86	1	0.353	OR = 0.41	Med	
Hamilton Rating Scale for Depression	6.7 ± 5.9	3.6 ± 4.1	8.8 ± 6.1	χ ² = 2.99	1	0.084	d = −0.66	Med	
Short form health survey: mental component	50.5 ± 11.9	51.3 ± 16.7	50.1 ± 8.5	χ ² = 9.60	1	0.002	d = 1.00	Lg	
Short form health survey: physical component	42.3 ± 10.3	46.7 ± 9.4	39.6 ± 10.2	χ ² = 0.29	1	0.588	d = 0.15		
Social Problem Solving Inventory	104 ± 10.3	105 ± 13.5	104 ± 8.0	χ ² = 1.09	1	0.296	d = 0.30	Sm	

PST-PC, Problem Solving Therapy for Primary Care; DIET, dietary education; mag, magnitude; lg, large; sm, small; N, number; *df*, degrees of freedom; *t* refers to student's *t*-test; χ^2 refers to chi-square.

The data are reported as means ± standard deviation.

^aTest statistic and effect size for Beck Depression Inventory derived from cumulative logistic regression. Test statistics and effect sizes for remaining outcomes were derived from linear regressions of standardized scores. All models were adjusted for baseline score.

^bCohen's conventions; *d* refers to Cohen's *d*; OR refers to odds ratio.

^cA non-normal distribution required binning: 0–5, 6–14, and 15–63.