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Problem-Solving Therapy Reduces Suicidal Ideation In Depressed Older Adults with Executive Dysfunction

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Abstract

Objective—To test the hypothesis that Problem Solving Therapy (PST) is more effective than Supportive Therapy (ST) in reducing suicidal ideation in older adults with major depression and executive dysfunction. We further explored whether patient characteristics, such as age, gender and additional cognitive impairment load (eg: memory impairments) were related to changes in suicidal ideation over time.

Design—Secondary data analysis using data from a randomized clinical trial allocating participants to PST or ST at 1:1 ratio. Raters were blind to patients' assignments.

Setting—University medical centers.

Participants—221 people aged 65 years old and older with major depression determined by SCID diagnosis and executive dysfunction as defined by a score of 33 or less on the Initiation-Perseveration Score of the Mattis Dementia Rating Scale or Stroop Interference Task score of 25 or less.

Interventions—12 weekly sessions of Problem Solving Therapy or Supportive Therapy.

Main Outcome Measures—The suicide item of the Hamilton Depression Rating Scale (HDRS).

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Dr. Arean had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Results—Of the 221 participants, 61% reported suicidal ideation (SI). The ST group had a lower rate of improvement in SI after 12 weeks (44.6%) than did the PST group (60.4%, Fisher's exact test $p = 0.031$). Logistic regression showed significantly greater reductions in SI in elders who received PST at both 12 weeks (OR = .50, $Z = -2.16$, $p = 0.031$) and 36 weeks (OR=0.5, $Z = -1.96$, $p = 0.05$) after treatment.

Conclusion—PST is a promising intervention for older adults who are at risk for suicide.

Introduction

Older adults have one of the highest suicide rates of any age demographic globally. People over the age of 65 comprise roughly 12 percent of the U.S. population and yet they account for 16 percent of suicide deaths[1]. The trends for death by suicide in older populations have not diminished over three decades [2], despite several years of research to better understand the predictors and precursors of late life suicide, as well as intervention research demonstrating the positive effects of depression intervention on reductions in suicidal ideation[3-5]. It is well known that 90% of older people who take their lives suffered from a psychiatric disorder[6] with depressive disorders being the most common psychiatric diagnoses of elderly suicide victims[7]. Furthermore, late life suicidal ideation is a risk factor for suicide [4, 8, 9], and executive dysfunction[10, 11], in particular impulsivity [12-14], and impairments in risk-sensitive decision making[14, 15] are associated with greater suicidal ideation in older adults. Given that these deficits in executive function (ED) are common in depressed older adults[16] and is related to suicidal ideation[11, 17], identifying older adults with depression and ED and providing them with interventions that target executive deficits may be one way to correct the trends in death by suicide in those over the age of 65.

We have previously demonstrated that Problem Solving Therapy (PST)[18], a behavioral intervention targeting executive deficits in older adults with major depression, results in significant improvements in depression[19], disability[20], and cognitive impairment[21]. PST has the potential to be an effective intervention for executive correlates of suicidal risk. PST helps patients to engage in a thoughtful process of identifying goals, considering different options to obtaining the goal, considering the potential benefits of different strategies for achieving these goals, and then implementing the plan[22]. This process may help older adults with suicidal ideation by reducing the potential for impulsive action and provide these patients with a means for engaging in effective risk-sensitive decision-making[15].

Using data from a large clinical trial (N=221), this study compared the efficacy of a 12-week course of PST to a 12-week course of supportive therapy in older adults with major depression and executive dysfunction. The main hypothesis in this secondary data analysis is that PST would be more effective in reducing suicidal ideation than supportive therapy at 12 and 36 post-treatment initiation.

Methods

This a secondary data analysis from a randomized clinical trial that used a parallel design to compare depression severity in participants allocated to PST or ST at a 1:1 ratio. We use the data from this original study to assess the relative impact of these two interventions on suicidal ideation. The procedures for the trial have been published elsewhere[19, 20], and the methods that are specifically relevant to this report are reiterated here.

Participants

Participants were recruited by Weill-Cornell and University of California, San Francisco research groups between 12/2002 and 11/2007. The institutional review boards of both universities approved the studies and informed consent process.

Participants were selected from clinician referrals and a group of advertisement responders after interviews by trained raters credentialed by the Weill-Cornell Advanced Center for Services Research. Inclusion criteria were: 1) age 60 years or older; 2) a diagnosis of major depression without psychotic features on the *Structured Clinical Interview for Axis I DSM-IV Disorders (SCID-R/DSM-IV)* (Spitzer, Williams, & Gibbons, 1995); 3) a score of at least 20 on the 24-item Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960); 4) a score of at least 24 on the Mini-Mental State Examination (MMSE[23]); 5) a score of 33 or less on the Mattis Dementia Rating Scale initiation/preservation domain (DRS-IP) [24]; and 6) a Stroop Color-Word Test score of 25 or less [25]. We used the Golden version of the Stroop, which is the commonly used version in previous studies of late life depression and executive functioning. The DRS-IP and the Stroop were selected based on research demonstrating their predictive value in identifying people with ED and who are at risk for poor response to SSRI medications, the target population for the original trial[26].

Exclusion criteria were 1) use of antidepressants or other psychotherapy, 2) intent to attempt suicide in the near future, 3) Axis I diagnoses other than unipolar depression or generalized anxiety disorder, 4) antisocial personality, dementia, history of head trauma, acute or severe medical illness (i.e. delirium, metastatic cancer, decompensated organ failure, major surgery, recent stroke or myocardial infarction), 5) use of drugs known to cause depression, and inability to perform any activities of daily living even with assistance.

Randomization and Masking

Participants were assigned to PST or ST using random numbers in blocks of 5 participants generated by the biostatistics Unit of the Weill Cornell Institute of Geriatric Psychiatry. Raters were trained by the Assessment Core of the Weill-Cornell Center, were assessed for inter-rater reliability over the course of the study and were unaware of the randomization status of participants. Interventionists were aware of randomization but not the study hypotheses.

Interventions

The interventionists were PhD level clinical psychologists and Masters Level Social Workers with at least five years of post licensure clinical experience. They were trained and

supervised by experts in PST and ST at the UCSF Psychosocial Interventions Unit and delivered both interventions. To account for intervention quality, all therapists were monitored for treatment fidelity and differentiation by masked, independent psychotherapy experts who rated randomly selected audio and videotapes of therapy sessions. This is a methodology that is considered the gold standard for psychotherapy intervention research, and is considered the most robust test of behavioral interventions, avoiding problems associated with data nesting-by-therapists [27]. Training and certification consisted of a two-day training workshop, followed by evaluation of 3 PST and 3 ST pilot cases. Our policy in efficacy trials is to remove therapists who exhibit skill drift and other significant protocol drift, however no therapists had to be removed from the study for these reasons.

Problem-Solving Therapy

We used a 12-week version of problem solving therapy (PST) modified for patients with ED [28]. The PST modification used in this study was based on the Nezu manual[29] but differed in that it started with easy to solve problems to illustrate the problem solving process, therapists were more directive than is usual in PST, and sessions included incorporation of environmental prompts to facilitate initiation of action plans. PST consisted of 5 steps, identifying a problem and selecting a goal, brainstorming alternative solutions, applying a balanced review of the pros and cons of each solution, selecting a solution and creating an action plan, implementing and evaluating the action plan. Pertinent to participants with suicide risk were the brainstorming and decision making steps. In patients with impulsivity problems, one of the executive deficits associated with suicide risk, therapists were instructed to make sure participants generated at least 5 different solutions to a problem. In the case when one solution seemed the obvious choice, participants were instructed to consider the pros and cons of each solution generated, before finalizing their decision. This process demonstrated to participants the value of weighing all options, rather than “going with your gut” in deciding on solutions for problems. In participants with deficits in risk-sensitive decision making (eg: inability to make a careful evaluation of positive and negative outcomes of a solution, and select a solution based on an optimal outcome), therapists were instructed to support participants through the decision making process of the intervention, by ensuring they paid full attention to the positive and negative aspects of a solution, and not just the negative aspects of the solution.

Supportive Therapy

Supportive therapy (ST) is a 12-week intervention, similar to person-centered psychotherapy[19], and served as our treatment control. During weekly therapy sessions, therapists encouraged participants to discuss any issue the participant felt comfortable sharing, as long as it was related to their mood. Therapists engaged in active listening, by providing empathy regarding the participants' life circumstances and by remaining non-judgmental. Therapists did not provide any advice or directive interventions, but instead supported participants' ideas and willingness to discuss their feelings in session.

Assessment and Outcomes

Participants engaged in a total of four research interviews, an eligibility interviews, baseline assessment, and 12 and 36 week post-randomization interviews. Diagnosis and eligibility

was finalized in research conferences by agreement of two clinicians who reviewed the participant's history, data from the SCID and HDRS interviews and review of the MMSE, Stroop and Mattis IP scale scores. The primary outcome for this sub-study is the suicide item on the HDRS, which was collected at all assessment time points. This item has five grades: 0: Absent; 1: Feels life is not worth living; 2: Wishes he were dead; 3: Suicidal ideas; 4: Attempts at suicide (any serious attempt rates 4). The questions used to rate suicidal ideation were "This past week, have you had any thoughts that life is not worth living or that you'd be better off dead? What about having thoughts of hurting or even killing yourself? If yes: What have you thought about? Have you actually done anything to hurt yourself?" We collected additional data on potential predictors of treatment response, including measures of cognitive burden, (Wisconsin Card Sorting Test[30]) and the Hopkins Verbal Learning Task[31]), history of antidepressant drug use (the Composite Antidepressant Treatment Intensity Scale, [32], medical burden (the Charleston comorbidity index[33]), and disability (World Health Organization Disability Assessment Schedules II-12 item (WHODAS,[34]).

Data Analysis

To compare the efficacy of ST vs. PST, we formed an a priori hypothesis and then used Fisher's exact test and logistic regression to compare reduction in suicide ideation between the treatment groups in, respectively, unadjusted and adjusted analyses. All analyses were intent-to-treat, and included the entire 221 participants. We used regular rather than exact logistic regression because exact logistic regression was unable to handle the number of predictors for which we wished to adjust. Based on research regarding suicide risk factors in late life[35], adjustment variables were gender, age, ethnicity (Caucasian versus not), marital status (divorced or separated/married/never married), and education. Cognitive burden has also been found to be a predictor of suicide risk in older adults[10, 36], therefore the following variables were added to the adjusted model one at a time to assess association with change in suicidal ideation and its effect on the relationship between treatment and change in suicide ideation: HVL, MMSE, Stroop, the MDRS Initiation/preservation scale, and the WCST. Finally, disability has also been found to be a predictor of suicide risk in older adults[37], therefore we also added to the adjusted model baseline Sheehan and WHODAS scores.

Results

Participant flow

Of 653 older persons screened, 183 did not qualify for the study on the screening interview, and an additional 191 did not meet SCID criteria for major depression. Fifty-eight of those who were eligible were not randomized because they did not complete the baseline assessment, leaving 221 randomized to receive PST (n = 110) or ST (n = 111). Recruitment and participant flow (CONSORT table) is detailed elsewhere[19].

Participant Characteristics

The randomized participants were 65.5% female (n = 144) had a mean (SD) age of 73.0 (7.8) years and a mean (SD) of 15.3 (2.8) years of education. Participants were moderately

depressed, as evidenced by the HDRS scores on (Mean= 24.3, SD= 4.3) and mild to moderately disabled as determined by the WHODAS total score (Mean = 26.6, SD = 7.). Executive functions were within 1 standard deviation of normal functions, but fell within parameters associated with poor SSRI response, as determined by the DRS-IP (mean = 32.2, SD = 3.7), Stroop Scores (mean = 22.1, SD = 8.2), perseverative errors on the WCST (mean= 14.5, SD = 9).

Approximately 27% of participants had a history of past antidepressant drug treatment. No significant differences in demographic or clinical variables were noted between the two treatment arms and study sites, nor were there differences in key indicators between the groups at the start of treatment (see Table 1).

Change in Suicide Ideation 0-12 weeks

Of the 221 total participants, 61% (n = 135) reported suicidal thoughts at the baseline assessment. Only 2 participants in the PST group and 4 participants in the ST group showed a worsening of suicidal ideation since baseline. The PST group had a higher rate of improvement in suicide ideation (reduction in HDRS Suicide item score) after 12 weeks (60.4%) than did the ST group (44.6%, Fisher's exact test, $p = 0.031$); the adjusted odds of improvement for ST that was only half that of PST (OR = .50, $Z = -2.16$, $p = 0.031$). There were significant relationships between improvements in suicidal ideation and marital status and disability, but ethnicity, age, gender, and cognitive burden did not add to the variance. People who were single were less likely to show improvement in suicidal ideation (OR = 2.5, $Z = 2.10$, $p = .036$) and disabled participants were more likely to show improvement (OR= 1.05 per unit increase in WHODAS, $Z = 2.03$, $p = .042$).

Change in Suicide Ideation 0-36 weeks

At 36 weeks, there were significant effects of treatment favoring PST, (OR = 0.50, $Z = -1.94$, $p = 0.046$). There was a significant effect for age (OR = 0.57 per decade, $Z = -2.59$, $p = 0.01$) with those who were younger being less likely to be suicidal at 36 weeks. As in the 12-week model, gender, ethnicity, cognitive burden were not statistically significantly associated with treatment outcomes. Although disability was slightly positively associated with change in suicidal ideation at 36 weeks, this change was not statistically significant.

Discussion

The main finding of this analysis is that older adults suffering from major depression and executive dysfunction had greater reduction in suicidal ideation during treatment with PST than ST. The beneficial effect of PST over ST in suicidal ideation persisted 24 weeks after the end of treatment. Changes in suicidal ideation overtime were most pronounced in participants who were younger and who reported greater disability prior to treatment initiation, while those who had never been married tended to show less improvement in suicidal ideation. Gender, ethnicity, age and cognitive burden did not influence changes in suicidal ideation. The importance of this finding is underscored by the fact that suicide risk is particularly high in older adults and those with executive impairments, and that this

population has a poor response to antidepressants. PST may be an effective treatment option for older adults at risk for suicide.

As an intervention for late life suicidal ideation, PST makes conceptual sense. Deficits in problem solving abilities are particularly pronounced in older adults with a history of suicide attempts compared to depressed older adults and non-depressed older adults[14, 39, 40]. We have shown that PST is effective for treating depression[19], disability associated with depression[20] and mild cognitive impairments[21], three major risk factors for suicide risk in older adults. Therefore, it is not surprising that PST would be effective in addressing suicidal ideation as well. Although the design of this study does not permit identification of the exact mechanisms by which PST led to greater improvement of suicidal ideation than ST, it is likely that changes in ideation were related to changes in mood over time. Another possibility is that PST increases the patients' ability to clearly define problems, identify alternatives, develop an effective approach for conceptualizing and implementing solutions to what otherwise might have appeared as insurmountable problems. The data from this study provide the groundwork for future research on the effects of PST and other interventions that target executive functions on suicide prevention in older adults.

This study also reports on potential predictors of treatment outcome on suicide in late life. It is well known that ethnicity, age, gender and cognitive burden are risk factor for late life suicidality[41, 42]. While younger age predicted improvements at 36 weeks, gender, ethnicity and cognition did not predict changes in suicidal ideation at any time point. It may be that although these variables confer risk for suicide, they do not influence responsive to psychotherapeutic intervention. Not surprisingly, older adults who have never been married tended to have poorer outcomes. A number of studies have shown that social support influences treatment outcomes in older adults[43, 44]. Other interventions that address interpersonal problems and social isolation may hold particular promise for older adults with limited social support[45-47]. Finally, while disability predicted to treatment outcome at 12 weeks, that effect was not found at 36 weeks. This effect could be due to the enduring nature of disability. While more disabled participants may have experienced immediate benefits of treatment, the effect may deteriorate over time without on-going treatment. Future research should explore the role of boost sessions for disabled adults with depression.

This study has limitations. First, this is a secondary data analysis and as such an exploratory study. Although we found positive effects for PST on suicidal ideation in older adults with late life major depression and executive impairment, future research should focus on confirmation of this effect on a population specifically identified for suicide risk. Another limitation is that this is a sample of adults with executive dysfunction. The absence of a comparison group without executive dysfunction limits our ability to make assertions regarding PST's specific indication for this population. Finally, although we were able to identify predictors of reduction in suicidal ideation, we are not powered to measure moderators of outcome. Future research should consider investigating moderators of intervention outcomes in older adults at risk for suicide.

Conclusions

This study demonstrated that participants with late life depression and executive dysfunction who received PST were more likely to experience a decrease in suicidal ideation than those who received ST during treatment and 24 weeks later. Given the reduction in suicidal ideation and other positive outcomes associated with PST for depressed elders with executive dysfunction[19, 20], health and mental health providers are encouraged to consider PST when deciding on a course of treatment for older adults suffering from depression and executive dysfunction.

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Table 1
Demographic and Clinical Characteristics of Study Participants

Variable	Problem Solving Therapy (N=110)		Supportive Therapy (N=111)		p.
	Mean	SD	Mean	SD	
Age	72.8	7.6	73.2	7.9	0.71
Education (years)	15.0	2.6	15.5	3.0	0.14
Hamilton Depression Rating Scale	24.1	3.9	24.5	4.6	0.96
Mini Mental Status Exam	27.7	1.8	27.9	1.6	0.19
Stroop Color Word Test	21.9	8.6	22.2	7.9	0.39
WHO Disability Assessment	27.0	7.7	26.2	7.0	0.79