

Original Investigation

Problem Adaptation Therapy for Older Adults With Major Depression and Cognitive Impairment

A Randomized Clinical Trial

Dimitris N. Kiosses, PhD; Lisa D. Ravdin, PhD; James J. Gross, PhD; Patrick Raue, PhD; Nabil Kotbi, MD; George S. Alexopoulos, MD

IMPORTANCE Problem adaptation therapy (PATH) is a treatment for older adults with major depression, cognitive impairment (from mild cognitive deficits to moderate dementia), and disability. Antidepressants have limited efficacy in this population and psychosocial interventions are inadequately investigated.

OBJECTIVE To test the efficacy of 12-week PATH vs supportive therapy for cognitively impaired patients (ST-CI) in reducing depression and disability in 74 older adults with major depression, cognitive impairment, and disability.

DESIGN, SETTING, AND PARTICIPANTS A randomized clinical trial at the Weill Cornell Institute of Geriatric Psychiatry from April 1, 2006, to September 31, 2011. Interventions were administered at the participants' homes. Participants included 74 older individuals (age ≥ 65 years) with major depression and cognitive impairment to the level of moderate dementia. They were recruited through collaborating community agencies of Weill Cornell Institute of Geriatric Psychiatry and were randomly assigned to 12 weekly sessions of PATH or ST-CI (14.8% attrition rate).

INTERVENTIONS Home-delivered PATH vs home-delivered ST-CI. Problem adaptation therapy integrates a problem-solving approach with compensatory strategies, environmental adaptations, and caregiver participation to improve patients' emotion regulation. Supportive therapy for cognitively impaired patients focuses on expression of affect, understanding, and empathy.

MAIN OUTCOMES AND MEASURES Mixed-effects models for longitudinal data compared the efficacy of PATH with that of ST-CI in reducing depression (Montgomery-Asberg Depression Rating Scale) and disability (World Health Organization Disability Assessment Schedule II) during 12 weeks of treatment.

RESULTS Participants in PATH had significantly greater reduction in depression (Cohen d , 0.60; 95% CI, 0.13-1.06; treatment \times time, $F_{1,179} = 8.03$; $P = .005$) and disability (Cohen d , 0.67; 95% CI, 0.20-1.14; treatment \times time, $F_{1,169} = 14.86$; $P = .001$) than ST-CI participants during the 12-week period (primary outcomes). Furthermore, PATH participants had significantly greater depression remission rates than ST-CI participants (37.84% vs 13.51%; $\chi^2 = 5.74$; $P = .02$; number needed to treat = 4.11) (secondary outcome).

CONCLUSIONS AND RELEVANCE Problem adaptation therapy was more efficacious than ST-CI in reducing depression and disability. Problem adaptation therapy may provide relief to a large group of depressed and cognitively impaired older adults who have few treatment options.

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Late-life major depressive disorder (MDD) frequently occurs in patients with cognitive impairment, with prevalence rates up to 40%.^{1,2} Late-life major depression, cognitive impairment, and disability contribute to impaired social and interpersonal functioning and increase the risk for poor medical outcomes, nursing home placement, and all-cause mortality.³⁻¹⁰ Reducing depression and disability may delay or prevent these adverse outcomes.¹¹

Available antidepressants have limited efficacy in depressed older adults and their efficacy is further compromised in those with executive dysfunction¹²⁻¹⁴ or dementia,^{2,15-18} bringing to remission less than 40% of these patients. Moreover, psychosocial interventions for community-living older adults with MDD and cognitive impairment have been tested mainly in individuals aged 60 to 70 years, mildly cognitively impaired ambulatory patients who can attend outpatient treatment.^{19,20} One exception is a behavioral intervention for depression in dementia²¹ that has taught caregivers how to problem solve and schedule pleasant events to reduce care-recipients' depression.²¹ However, most participants in that study had moderate to severe dementia and one-fourth of them had minor depression.²¹ Therefore, existing psychosocial interventions have not adequately investigated older adults with MDD, cognitive impairment up to the level of moderate dementia, and disability.

Problem adaptation therapy (PATH) is a novel home-delivered psychotherapy designed to decrease depression and disability²² in older adults with MDD, cognitive impairment ranging from mild cognitive deficits to moderate dementia, and disability. Problem adaptation therapy aims to improve emotion regulation and reduce the negative impact of behavioral and functional limitations. The strategies of PATH are consistent with the process model of emotion regulation^{23,24} (Table 1), which highlights the following 5 ways to regulate emotions: situation selection, situation modification, attentional deployment, cognitive change, and response modulation. To achieve emotion regulation, PATH integrates a problem-solving approach with compensatory strategies, environmental adaptations, and caregiver participation. The home delivery aspect of PATH, its systematic use of compensatory strategies and environmental adaptations, and its focus on emotion regulation distinguish PATH from other interventions for late-life depression with cognitive impairment.^{21,23,24}

In a pilot study based on a different sample, we reported data on PATH's feasibility and acceptability.²⁵ The present study examines the efficacy of 12-week home-delivered PATH vs supportive therapy for cognitively impaired patients (ST-CI) in reducing depression and disability in 74 older adults with MDD, cognitive impairment ranging from mild deficits to moderate dementia. We hypothesized that PATH participants would have greater reduction in depression and disability (primary outcomes) than ST-CI participants during the 12-week treatment. We also compared remission rates, time to remission, and patient and caregiver treatment satisfaction between PATH and ST-CI (secondary outcomes). Finally, we explored the treatment effects in older adults with pharmacotherapy-resistant depression and examined whether baseline cognitive impairment moderated treatment outcomes (exploratory analyses).

Table 1. PATH and the 5 Stages of the Process Model of Emotion Regulation

Process of Emotion Regulation	Goal	How PATH Works
Situation selection	Select the situations a person is exposed to	(1) Patient, caregiver (if necessary), and therapist identify situations, problems, and concerns that are upsetting to patient and trigger negative emotions associated with depression (eg, helplessness, hopelessness, or worthlessness); a plan is devised to avoid these situations (2) Patient, caregiver (if necessary), and therapist identify situations and activities that trigger positive emotions; a plan is devised to promote these situations
Situation modification	Change the situation a person is exposed to	(1) Patient, caregiver (if necessary), and therapist identify compensatory strategies or environmental adaptation tools (eg, calendar, signs, notes, or step-by-step plans) to bypass functional limitations that trigger a strong negative emotional response to patient (2) The involvement of the caregiver is evaluated to modify emotionally charged situations
Attentional deployment	Shift the individual's attention within a situation	Attention, planning, visual, and acoustic tools (eg, notes, shaping procedures to sustain attention, step-by-step plans, or timers) are used to bypass functional limitations and redirect the patient's attention to positive aspects of life
Cognitive change	Change how the individual thinks about the situation	Therapist helps the patient and caregiver (if necessary) to develop a realistically hopeful approach to functional and cognitive limitations (eg, cognitive impairment doesn't necessarily prevent the patient from enjoying life; the patient may focus on cognitive strengths; environmental adaptation tools may reduce functional limitations)
Response modulation	Direct efforts to alter the individual's emotional responses	Therapist helps the patient and caregiver (if necessary) to use tools during emotionally charged situations (eg, using techniques to reduce escalation of tension between patient and caregiver)

Abbreviation: PATH, problem adaptation therapy.

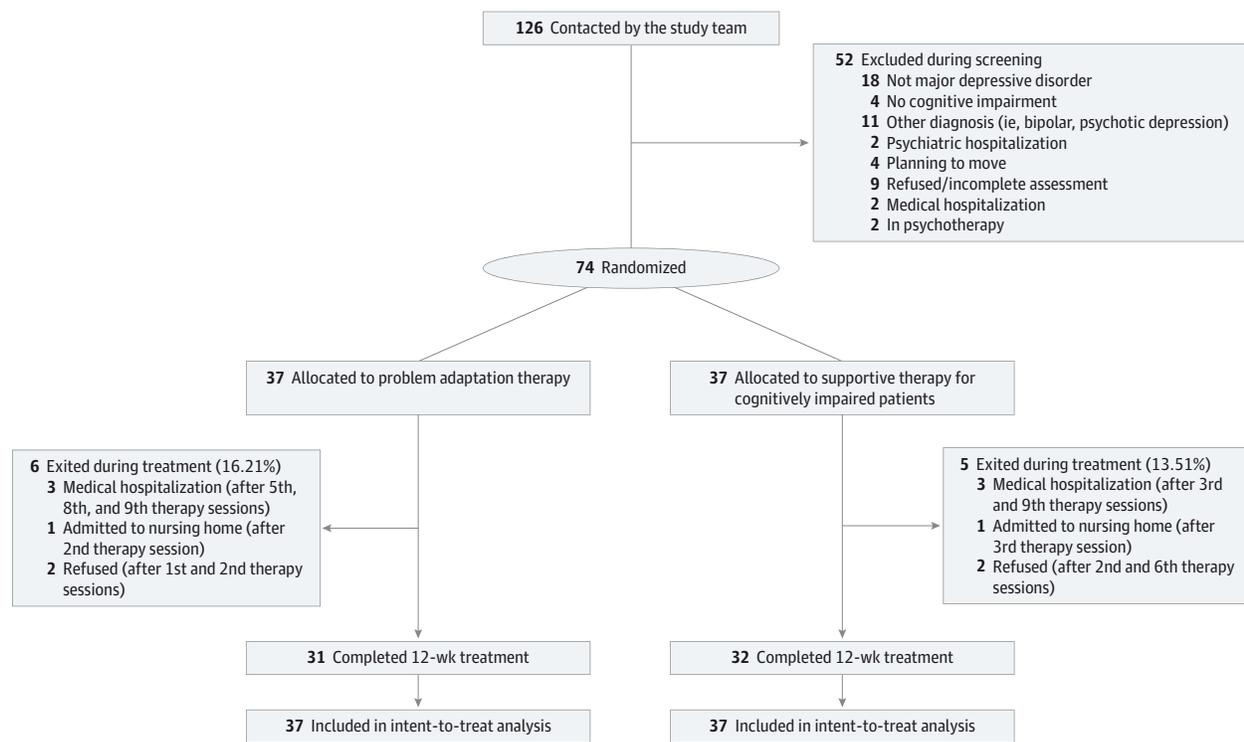
Methods

Participants

The study was approved by the institutional review board of the Weill Cornell Medical College. Seventy-four participants (mean [SD] age = 80.90 [7.48] years; range = 66-95 years; 74.32% women) were recruited through collaborating community agencies of the Weill Cornell Institute of Geriatric Psychiatry.

Eligible participants had the following: (1) nonpsychotic, unipolar MDD *DSM-IV* diagnosis (*SCID-R*)²⁶; (2) a Montgomery-Asberg Depression Rating Scale (MADRS) score of 17 or higher²⁷; (3) at least mild cognitive deficits (age-adjusted and education-adjusted scaled score of ≤7 on the Dementia Rating Scale [DRS] subscale of memory or initiation perseveration²⁸); (4) disability (at least 1 impairment in instrumental activities of daily living²⁹); and (5) limited mobility to attend weekly outpatient treatment based on a participant, caregiver, or physician's report. Eligible participants were either not taking antidepressants, cholinesterase inhibitors, or memantine or taking a stable dosage for at least 6 weeks prior to study entry without any medical recommendation for a medication change in the next

Figure 1. CONSORT Flow Diagram



Participant progress through the phases of the randomized trial.

3 months. Pharmacotherapy was uncontrolled and provided by community physicians.

Exclusion criteria included other Axis I psychiatric disorders (except comorbid anxiety disorders); acute or severe medical illness (eg, metastatic cancer or liver failure); drugs known to cause depression; current involvement in psychotherapy; advanced dementia (ie, a Mini-Mental State Examination [MMSE] score³⁰ of <17); and aphasia, or the inability to speak English. Participants and caregivers provided written informed consent. Involvement of a caregiver was encouraged but not required.

Capacity to Consent

Evaluation with the Cornell Capacity to Consent Scale (available from authors) confirmed comprehension of voluntary participation in research, study risks and benefits, and privacy and confidentiality. A physician not affiliated with the study reviewed the scale and excluded potential participants with questionable capacity.

Randomization and Masking

Randomization was designed in SAS³¹ in blocks of 4 participants and the allocation ratio of 1:1. The study coordinator sequentially allocated participants to either PATH or ST-CI (Figure 1). Raters were independent evaluators unaware of randomization status and study hypotheses. Participants were unaware of study hypotheses and were instructed not to reveal their randomization status to raters.

Therapists Training and Treatment Fidelity

The therapists were 3 clinical psychologists, 4 clinical social workers, and 1 clinical doctoral candidate. Each therapist administered both treatments. To control for potential bias, therapists were thoroughly trained and closely supervised and sessions were evaluated for treatment fidelity. Training consisted of a 2-day workshop and supervision of 2 training cases per treatment. Treatment fidelity scores were very good to excellent (mean: PATH = 4.6; ST-CI = 4.5 of 5) based on a random review of 20% of week 1, week 6, and week 12 audiotaped sessions. Therapists had weekly group supervision and additional individual supervision as needed.

Assessments and Instruments

Two clinician investigators agreed on the diagnosis after reviewing *SCID-R* and other ratings and certified raters performed inhome assessments at study entry (baseline) and at weeks 4, 8, and 12. The MADRS and the 12-item interviewer-administered World Health Organization Disability Assessment Schedule II (WHODAS-II)³² were the primary measures for depression and disability, respectively. The WHODAS-II assesses a participant's difficulty in the following 6 domains of functioning: understanding and communicating, moving and getting around, caring for self, interacting with other people, engaging in work and household activities, and participating in the community.³² Each domain includes 2 items scored 1 to 5 (1 = none; 5 = extreme/cannot do). The day-to-day work activities item was skipped because most partici-

pants did not work. The WHODAS-II may predict adverse outcomes in older adults with severe medical burden. A 1-point change in baseline WHODAS-II scores was associated with a 12% increased risk for severe disability or death in patients with chronic obstructive pulmonary disease, heart failure, and stroke.³³ The Performance Assessment of Self-Care Skills (PASS) was listed in the protocol but omitted early in the trial.

Overall cognitive impairment was assessed with the DRS total score,²⁸ executive dysfunction with the DRS-initiation/perseveration subscale and the Stroop color word test,³⁴ memory with the DRS memory subscale and Hopkins Verbal Learning Test-Revised,³⁵ and medical burden with the Charlson Comorbidity Scale.³⁶ Participants were classified as having probable or definite dementia based on *DSM-IV* criteria including progressive cognitive decline in the past 6 months and significant impairment in 2 DRS areas (scaled score, ≤ 5).²⁸

Full and partial remission was defined as a MADRS total score of ≤ 7 or ≤ 10 for 2 consecutive weeks, respectively. Response was defined as 50% or higher reduction in MADRS scores from baseline to week 12. Intensity of pharmacotherapy in the past 4 weeks was measured with the Composite Antidepressant Score-Revised for older adults³⁷ (eTable 1 in the Supplement) based on reports from patients, caregivers, and family physicians (0 = absence of pharmacotherapy, 1 or 2 = inadequate antidepressant treatment, and 3 or 4 = adequate antidepressant treatment). Pharmacotherapy-resistant depression during the index episode was defined as an inadequate response (ie, meeting criteria for MDD and a MADRS score of ≥ 17), despite an adequate antidepressant trial of at least 4 weeks (ie, a Composite Antidepressant Score of 3 or 4).³⁸ Patients and caregivers' treatment satisfaction was assessed with the 3-item client satisfaction questionnaire³⁹ at weeks 4, 8, and 12 (eTable 2 in the Supplement).

Interventions

Problem Adaptation Therapy

Problem adaptation therapy is a home-delivered psychosocial intervention administered in 12 weekly sessions. It uses personalized strategies to regulate emotions (reduce negative and promote positive emotions) and lessen the negative impact of emotions. During the initial 2 sessions, situations or problems that trigger negative emotions or inhibit positive emotions (eg, lack of pleasurable activities) are identified. The PATH therapist and patient devise a plan to regulate emotions and reduce negative impact by using a hands-on problem-solving approach⁴⁰ and integrate PATH tools (environmental adaptations and compensatory strategies, such as a calendar, checklists, strategies to sustain or shift attention,⁴¹ and the step-by-step division of a task).⁴² When necessary, the caregiver participates in treatment such as facilitating the problem-solving process, promoting pleasurable activities, and helping the patient avoid negatively charged situations (Table 1). The most commonly reported problems in our study were memory and organizational deficits, behavioral/functional limitations, interpersonal tension, social isolation, and anhedonia.

Supportive Therapy for Cognitively Impaired Older Adults

Supportive therapy for cognitively impaired older adults was used as an attention control condition. Supportive therapy for cognitively impaired older adults is a home-delivered psychotherapy administered in 12 weekly sessions²⁵ that focus on non-specific therapeutic factors, such as facilitating expression of affect, conveying empathy, highlighting successful experiences, and imparting optimism. To parallel the delivery of PATH, willing caregivers were invited to participate in ST-CI sessions.

Statistical Analysis

Data analyses included all eligible participants with baseline assessments following the intent-to-treat principle. We conducted univariate analyses between PATH ($n = 37$) and ST-CI ($n = 37$) on clinical and demographic variables using the Mann-Whitney Wilcoxon (continuous) and the Fisher exact tests (categorical).

Primary Outcomes

We performed mixed-effects models for longitudinal data to compare the efficacy of PATH and ST on depression (MADRS total score) and disability (WHODAS-II total score) during 12 weeks of treatment. The models included time-trend parameters (time and time squared), treatment group, and time by treatment interaction.

Secondary Outcomes

The χ^2 tests and Cox proportional hazards models were used to compare full and partial remission and response rates as well as time to full and partial remission. Mixed-effects models analysis was used to compare patient and caregiver's treatment satisfaction between treatments.

Exploratory Analyses

Mixed-effect models were also used to compare the course of depression between treatments in patients with pharmacotherapy-resistant depression and test moderators on treatment outcomes (depression and disability). The models for testing the moderator included a potential moderator (dementia diagnosis or DRS total at baseline), moderator by treatment interaction, and moderator by time interaction. A 2-tailed a level of .05 was used for each statistical test. All analyses were performed with SAS software version 9.2.³¹

Sample Size Determination

Based on a between-treatment effect size of 0.70 for depression and disability, we predicted that with at least 36 participants per group and 13% attrition rate we would have at least 0.80 power at a .05 two-tailed significance level with an intraclass correlation coefficient of 0.40.

Results

Seventy-four participants were randomized to PATH ($n = 37$) vs ST-CI ($n = 37$). They had mild to moderate major depres-

Table 2. Demographic and Clinical Characteristics of 74 Older Adults With Major Depression Disorder and Cognitive Impairment^a

Characteristic	PATH (n = 37)	ST-CI (n = 37)	Fischer Exact P Value
Sex, No. (%)			
Female	26 (70.27)	25 (78.38)	0.6
Race/ethnicity, No. (%)			
White	30 (81.08)	31 (83.78)	1
African American	7 (18.92)	6 (16.22)	
Hispanic (all white)	3 (8.11)	0 (0.00)	0.24
Probable or definite dementia, ^a No. (%)			0.64
Dementia	21 (56.76)	18 (48.65)	
Mild	12 (32.43)	12 (32.43)	
Moderate	9 (24.32)	6 (16.22)	
Taking antidepressants, No. (%)	24 (64.86)	23 (62.16)	>.99
Drug-treatment resistant, No. (%)	15 (40.54)	16 (43.24)	>.99
Depression episodes (≥3), No. (%)	18 (54.55)	17 (51.52)	>.99
Any anxiety disorders, No. (%)	12 (32.43)	11 (29.73)	>.99
Taking cognitive enhancers, No. (%)	4 (10.81)	6 (16.22)	0.74
Characteristic	PATH	ST-CI	Mann-Whitney Wilcoxon Z Score; P Value
Age, mean (SD), y	80.78 (7.23)	81.03 (7.61)	0.31; .76
Age at onset of depression, mean (SD), y	54.92 (27.53)	63.06 (24.08)	1.09; .28
Education, mean (SD), y	12.86 (3.37)	13.35 (2.72)	0.29; .77
Attended therapy sessions, mean (SD), No. (%) ^b	10.62 (3.05)	10.95 (2.73)	-0.81; .42
Total score, mean (SD)			
MADRS	21.08 (3.74)	21.41 (3.26)	0.56; .58
WHODAS-II	33.19 (8.10)	32.35 (4.75)	-0.99; .32
MAI-IADL	18.36 (3.65)	19.26 (4.19)	-0.85; .40
DRS	115.80 (13.88)	121.14 (8.97)	-1.37; .17
Executive dysfunction, mean (SD)			
DRS-IP score	27.84 (5.64)	28.73 (4.86)	0.54; .59
Stroop color word score	19.07 (11.50)	19.28 (6.62)	-0.16; .87
Memory, mean (SD)			
DRS memory score	19.43 (4.94)	21.08 (3.00)	-0.70; .49
HVL score			
Immediate recall	3.31 (2.06)	4.11 (1.31)	-1.75; .08
Delayed recall	4.31 (3.24)	5.19 (2.84)	-1.54; .12
Charlson total, mean (SD) ^c	2.79 (2.20)	3.32 (2.78)	0.58; .57
Intensity of antidepressant medication treatment, mean (SD) ^d	1.77 (1.44)	1.94 (1.63)	0.52; .61

Abbreviations: DRS, Dementia Rating Scale; DRS-IP, Dementia Rating Scale–initiation/perseveration subscale; HVL, Hopkins Verbal Learning Test–Revised; MADRS, Montgomery-Asberg Depression Rating Scale; MAI-IADL, Philadelphia Multiphasic Assessment Instrument–Instrumental Activities of Daily Living; PATH, problem adaptation therapy; ST-CI, supportive therapy for cognitively impaired patients; WHODAS-II, World Health Organization Disability Assessment Schedule-II (12 items).

^a Mild dementia was defined by a DRS total scaled score of more than 3 and 5 or less, after adjusting for age and education (DRS-2 manual); moderate dementia was defined by a DRS total scaled score of 3 or less, after adjusting for age and education (mild dementia: mean DRS total = 118.79, range = 111-126; moderate dementia: mean DRS total = 104.10, range = 78-115).

^b Of patients who completed the study, 90.5% had 12 therapy sessions; 6.3% had 11 sessions; and 3.2% had 10 sessions.

^c Charlson Comorbidity Index.

^d Composite Antidepressant Score–Revised.

sion, significant cognitive impairment (52% met diagnostic criteria for probable or definite dementia), and pronounced disability (Table 2).

Preliminary Analyses

There were no significant differences in demographic or baseline clinical variables between the 2 treatments. Seventy patients had primary caregivers (PATH = 36; ST-CI = 34), such as children or children-in-laws (65.71%), spouses (14.29%), siblings or siblings-in-laws (4.29%), other family members (2.86%), and other (including home aides) (12.86%). Approximately 80% of caregivers had at least 1 session with the therapist (PATH = 30; ST = 27). There were no significant differences between treatments on caregiver relationship and sex

or the average number of sessions attended by caregivers (PATH = 3.91; ST-CI = 3.81). Adverse events were unrelated to the study and comparable between treatments.

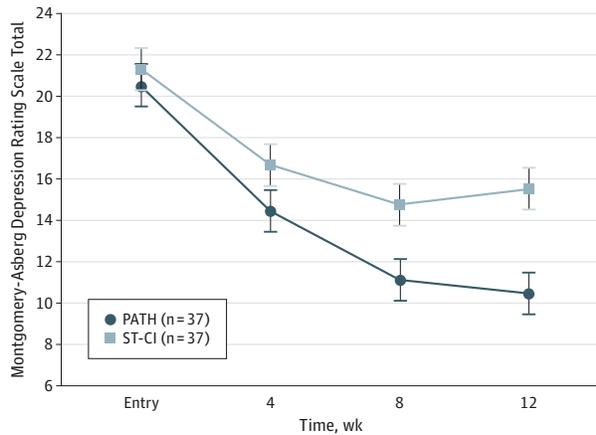
Of the 74 participants randomized, 85.1% completed the assessments (PATH = 83.8%; ST = 86.5%; Fisher exact = not significant) (Figure 1). There were no significant differences in demographic and baseline characteristics between those who dropped out and those who completed the study.

Primary Outcomes

Depression

In a mixed-effects model consisting of treatment group, time, time squared, and treatment group by time interaction, PATH participants had significantly greater reduction in depres-

Figure 2. Efficacy of Problem Adaptation Therapy (PATH) vs Supportive Therapy for Cognitively Impaired Patients (ST-CI) in Reducing Depression (Total Montgomery-Asberg Dementia Rating Scale Score)



Depression scores during 12 weeks of PATH vs ST-CI in 74 elderly individuals with major depression, cognitive impairment, and disability based on the least squares means and standard error of the mixed-effects model: time + time squared + treatment + treatment × time.

sion than ST-CI participants during the 12-week period (treatment group × time interaction, $F_{1,179} = 8.03$; $P = .005$; Cohen d [95% CI], week 4 score difference = 0.38 [-0.07 to 0.84]; week 8 score difference = 0.79 [0.31 to 1.26]; week 12 score difference = 0.60 [0.13 to 1.06]; **Figure 2**). Participants in PATH had greater reduction by approximately 0.36 (95% CI, 0.60-0.11) MADRS points per week (or 43% greater decline at week 12) than ST-CI participants. Participants in PATH also had significantly lower depression scores at 8 weeks ($t_{83.4} = -2.91$; $P = .005$) and 12 weeks ($t_{136} = -3.47$; $P = .001$).

Disability

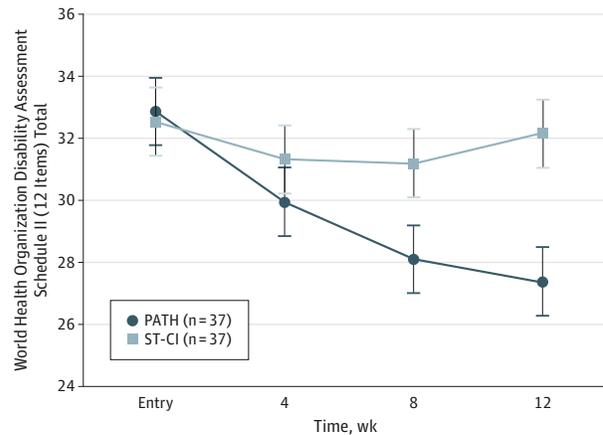
In a mixed-effects model consisting of treatment group, time, time squared, and treatment group by time interaction, PATH participants had significantly greater reduction in disability (WHODAS-II total score) than ST-CI participants during the 12-week period (treatment group × time interaction: $F_{1,169} = 14.86$; $P = .001$; Cohen d [95% CI], week 4 score difference = 0.44 [-0.02-0.90]; week 8 score difference = 0.36 [0.10-0.82]; and week 12 score difference = 0.67 [0.20 to 1.14]; **Figure 3**). Participants in PATH had greater reduction by approximately 0.43 (95% CI, 0.64 to 0.21) WHODAS-II points per week (or 93% greater decline at week 12) than ST-CI participants. Finally, PATH participants had significantly lower disability scores at week 8 ($t_{74.8} = 2.13$; $P = .04$) and week 12 ($t_{106} = 3.00$; $P = .003$).

Secondary Outcomes

Full Remission (MADRS ≤ 7)

Participants in PATH had significantly greater remission rates at week 12 than ST-CI participants (37.84% vs 13.51%; $\chi^2_1 = 5.74$; $P = .02$; number needed to treat = 4.11). The Cox proportional hazards model revealed that PATH participants were almost 3.6 times more likely to remit at any point during the 12-week

Figure 3. Efficacy of Problem Adaptation Therapy (PATH) vs Supportive Therapy for Cognitively Impaired Patients (ST-CI) in Reducing Disability (Total World Health Organization Disability Assessment Schedule II Score)



Disability scores during 12 weeks of PATH vs ST-CI in 74 elderly individuals with major depression, cognitive impairment, and disability based on the least squares means and standard error of the mixed-effects model: time + time squared + treatment + treatment × time.

treatment than ST-CI participants ($\chi^2_1 = 5.16$; $P = .02$; hazard ratio = 3.67; 95% CI, 1.20 to 11.26).

Partial Remission (MADRS ≤ 10)

Participants in PATH had significantly greater partial remission rates at week 12 than ST-CI participants (62.16% vs 29.73%; $\chi^2_1 = 7.84$; $P = .005$; number needed to treat = 3.08). The Cox proportional hazards model revealed that PATH participants were almost 2.9 times more likely to partially remit at any point during the 12-week treatment than ST-CI participants ($\chi^2_1 = 4.02$; $P = .05$; hazard ratio = 2.85; 95% CI, 1.03 to 7.91).

Response

Participants in PATH had significantly greater response rates (≥50%) than ST-CI participants (66.67% vs 32.26%; $\chi^2_1 = 7.22$; $P = .007$).

Treatment Satisfaction

The mixed-effects model analysis revealed no significant differences in client satisfaction questionnaire scores at weeks 4, 8, and 12 between PATH vs ST-CI in participants or caregivers (eTable 2 in the Supplement).

Exploratory Analyses

In patients with pharmacotherapy-resistant depression (PATH = 15; ST-CI = 16), PATH participants had significantly greater reduction in depression than ST-CI participants (treatment group × time interaction: $F_{1,72.7} = 6.01$; $P = .02$; Cohen d [week 12] = 0.95 [0.71 to 2.22]). Ten (67%) PATH participants achieved at least partial remission and 5 (33%) of those achieved full remission. Finally, dementia diagnosis and the DRS total at baseline were not significant moderators of depression or disability outcomes.

Discussion

The principal findings of this study were that PATH reduced depression and disability more than ST-CI in older adults with MDD, cognitive impairment, and disability. This population is at high risk for morbidity and mortality; pharmacotherapy has limited efficacy and psychotherapies are sparse. Reductions in depression and disability were both statistically and clinically significant. Compared with ST-CI, participants in PATH had greater decline in depression (43%) and disability (93%), respectively, at week 12.

This is the first randomized trial, to our knowledge, of a psychosocial intervention for community-living older adults with MDD and cognitive impairment, of which more than half had dementia. Our findings are consistent with findings in samples with different degrees of depression and cognitive deficits.⁴³ Problem-solving therapy led to greater reduction in depression⁴⁴ and disability⁴⁵ than supportive therapy in older adults with MDD and mild executive dysfunction. Problem-solving therapy also reduced depression in medically ill home care patients without an MDD diagnosis.⁴⁶ Finally, a behavioral treatment, which influenced PATH's caregiver component, produced similar results in adults with moderate to severe dementia and minor depression or MDD.²¹

Both interventions were well accepted as evidenced by high treatment satisfaction scores, highlighting that the treatment effects on depression and disability were not a by-product of patient enjoyment or treatment satisfaction. High satisfaction scores even in nonremitted patients may reflect the need for home-delivered treatment in this population with limited resources.⁴⁷ Caregivers' treatment satisfaction with PATH was consistent with findings that most caregivers find treatment involvement helpful and constructive.^{48,49}

Almost 40% of our participants had at least 1 adequate antidepressant trial for their index episode and still met criteria for MDD. Even among those patients, PATH had significantly greater reduction in depression than ST-CI (Cohen *d* at week 12, 0.95). These results need to be replicated in an adequately powered trial, yet are promising for a large number of patients with limited treatment options.

The main innovations of PATH are its personalized structured problem-solving approach, use of compensatory strategies and environmental adaptations, and caregiver participation to improve emotion regulation. The presumed mechanism of action is that PATH reduces depression by improving emotion regulation through situation selection, situ-

ation modification, attentional deployment, cognitive change, and response modulation.^{23,24} Future studies are needed to test this mechanism of action and identify aspects of emotion regulation that are more effective in improving outcomes.

Limitations of the study included lack of information on the stability of PATH after 12 weeks, therapists' allegiance, and low remission rates. Future investigations may evaluate the long-term sustainability of treatment effects and the need for maintenance treatment. Because therapists administered both treatments, therapists' allegiance may have created bias. Future studies may assess the effects of allegiance on treatment outcomes. Nevertheless, therapists were thoroughly trained, closely supervised, and achieved high fidelity ratings. Although PATH full remission rates (MADRS score of ≤ 7) were low (38%), an additional 25% of PATH participants were partially remitted (MADRS score between 8 and 10). Future studies are needed to examine ways to strengthen PATH's efficacy and help partially remitted patients achieve full remission, such as conducting additional booster sessions for those patients.

Despite its efficacy, PATH faces dissemination challenges.⁵⁰ In this study, PATH was delivered at the patients' homes by trained clinicians who may not be available in agencies with limited resources. However, half of our therapists were social workers and were able to administer PATH with high fidelity. Social workers are employed by home health care organizations and their services are reimbursed by Medicare. Treatment fidelity studies of community-based social workers and studies of organizational interventions in home health care services may offer a view on PATH's dissemination potential. Despite the cost of PATH resources, comparable home-delivered interventions for demented patients are cost-effective.^{51,52}

Conclusions

This study demonstrates the efficacy of PATH vs ST-CI in reducing depression and disability in community-living older adults with depression, cognitive impairment, and disability. In this population at risk of adverse outcomes, antidepressants have limited efficacy and psychosocial interventions are inadequately investigated. Problem adaptation therapy was efficacious in reducing depression even in a group of older adults with pharmacotherapy-resistant depression but this observation needs to be confirmed in an adequately powered study. Overall, PATH may provide significant relief to this underserved population and their families.

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Acquisition, analysis, or interpretation of data: Kiosses, Ravdin, Gross, Raue.

Drafting of the manuscript: Kiosses, Ravdin, Kotbi, Alexopoulos.

Critical revision of the manuscript for important intellectual content: Kiosses, Gross, Raue, Kotbi.

Statistical analysis: Kiosses.

Obtained funding: Kiosses, Ravdin, Alexopoulos.

Administrative, technical, or material support: Kiosses, Ravdin, Kotbi, Alexopoulos.

Study supervision: Kiosses, Ravdin, Raue, Alexopoulos.

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