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Depression in Homebound Older Adults: Problem-Solving Therapy and Personal and Social Resourcefulness

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Abstract

The goal of problem-solving therapy is to teach patients systematic coping skills. For many homebound older adults, coping skills must also include both personal and social (help-seeking) resourcefulness. This study aimed to examine the relationship between perceived resourcefulness and depressive symptoms at postintervention and potential mediating effect of the resourcefulness among 121 low-income homebound older adults who participated in a pilot randomized controlled trial testing feasibility and preliminary efficacy of telehealth-PST. Resourcefulness Scale for Older Adults was used to measure personal and social resourcefulness. Only personal resourcefulness scores were significantly associated with depression outcomes at postintervention, and neither resourcefulness scores were significantly associated with group assignment. Analysis found no mediation effect of resourcefulness. The findings call for further research on potential mediators for the potentially effective depression treatment that could be sustained in the real world for low-income homebound older adults who have limited access to psychotherapy as a treatment modality.

Keywords

depression; help seeking; personal and social resourcefulness; problem-solving therapy

The rate of depression is significantly higher among medically ill, homebound older adults than among their ambulatory peers (Bruce et al., 2002; Ell, Unützer, Aranda, Sanchez, & Lee, 2005; Li & Conwell, 2007). In addition to multiple medical conditions and resulting functional impairment, risk factors for depression in homebound older adults include social isolation imposed by their disability, financial worries related to their medical and living expenses, lack of emotional and/or instrumental social support, loss of a loved one, and feelings of helplessness and worthlessness (Areán & Reynolds, 2005; Bruce et al., 2002; Choi & McDougall, 2007). Because of the impact these multiple medical and psychosocial factors have on depression in home-bound older adults, combined pharmacological and psychotherapeutic treatment is recommended. In the case of low-income homebound older

adults, case management is also an important part of depression treatment (Areán, Mackin, et al., 2010).

Problem-solving therapy in primary care (PST-PC), which was originally developed in England in the 1980s (Catalan et al., 1991; Mynors-Wallis, Gath, Lloyd-Thomas, & Tomlinson, 1995), is a psychotherapeutic intervention for late-life depression with a growing base of scientific evidence for its efficacy. This treatment is based on the social problem-solving theory of depression, which posits that the relationship between stressors and depression is influenced by the availability of problem-solving skills (D'Zurilla, 1986; Nezu, Nezu, & Perri, 1989). People with deficits in systematic problem-solving skills become vulnerable to depression because such deficits lead to ineffective coping attempts under high levels of stress. Thus, the goal of PST-PC is to teach participants skills in solving problems as a means of enabling them to self-manage and to control depression. Its treatment process focuses on participants' appraisal and evaluation of specific problems, their identification of the best possible solutions, and the practical implementation of those solutions, as well as on addressing anhedonia and psychomotor retardation through behavioral activation and increased exposure to pleasant events (D'Zurilla & Nezu, 2007; Mynors-Wallis, 2005).

In the United States, PST-PC was adapted for delivery in fast-paced primary care settings during the 1990s and is delivered in four to six 30- to 60-minute sessions (Hegel, Barrett, Cornell, & Oxman, 2002; Hegel, Barrett, & Oxman, 2000). The efficacy of PST-PC has been supported in multiple randomized controlled trials (RCTs), including the IMPACT study, a multisite RCT of late-life depression treatment in primary care (Alexopoulos et al., 2011; Areán, Hegel, Vannoy, Fan, & Unützer, 2008; Areán, Raue, et al., 2010; Cuijpers, van Straten, & Warmerdam, 2007b; Malouff, Thorsteinsson, & Schutte, 2007). Previous RCTs have also shown the efficacy of short-term, home-based PST, with or without antidepressant medication, for reducing depressive symptoms among homebound older adults (Ciechanowski et al., 2004; Gellis, McGinty, Horowitz, Bruce, & Misener, 2007).

In Gellis et al. (2007), the homecare patients who received six PST sessions, as compared with those who did not, had significantly higher problem-solving abilities, measured with the Social Problem-Solving Inventory (SPSI; D'Zurilla & Nezu, 1990) and significantly lower depressive symptoms, suggesting a possible mediating effect of problem-solving skills. The SPSI, which is often used to measure problem-solving ability, focuses on both problem orientation (positive vs. negative) and systematic and rational problem-solving skills (problem definition and formulation to solution implementation and verification). However, previous study findings showed that PST or PST-PC sessions improved problem-solving skills but not problem orientation (Kant, D'Zurilla, & Maydeu-Olivares, 1997).

For many homebound older adults who are not able to independently carry out daily living activities, problem-solving skills must also include both personal and social resourcefulness. Personal resourcefulness, as opposed to helplessness, is rooted in self-control and self-efficacy. It refers to what people do when stressful circumstances call for self-regulation and self-direction, and involves the use of self-help problem-solving strategies for coping with adversity or challenge (Rosenbaum, 1990). Social resourcefulness is one's ability and willingness to seek help from others—formal and/or informal sources—when faced with distress from unmet emotional and instrumental needs and to manage unpleasant affect associated with requesting or receiving help (Nadler, 1990; Rapp, Shumaker, Schmidt, Naughton, & Anderson, 1998). Rapp et al. found that social resourcefulness was robustly correlated with indicators of well-being among caregivers of persons with dementia and that it was also associated with personal resourcefulness.

Social resourcefulness may be especially important for low-income homebound older adults who are in need of formal and informal support for their financial and instrumental needs. However, many depressed, homebound older adults are reluctant to seek help due to feelings of helplessness, deeply engrained values of self-help and independence, and concerns about becoming a burden on their informal support systems. Among depressed, low-income older adults who have had financial and other life stressors throughout their lives, feelings of helplessness are often rooted in limited success of past help-seeking attempts as well as in depression (Choi & Jun, 2009). As these older adults' informal support systems also often struggle with their own financial and other multiple life stressors, the older adults do not want to be a burden on them. Helping their informal support system rather than meeting their own need tends to be a priority among these older adults (Proctor, Hasche, Morrow-Howell, Shumway, & Snell, 2008). In our previous study (Choi, Hegel, Marinucci, Sirrianni, & Bruce, 2012) of the type of problems and solutions that low-income homebound older adults with mild to severe depressive symptoms identified during their PST sessions, formal and informal help seeking was a chosen solution mostly to deal with problems with financial and living arrangement/housing/ neighborhood safety issues. For other types of problems such as housekeeping and cleaning, physical/functional and mental health issues, relationship conflict, and social isolation, the participants mostly chose self-control or personal resourcefulness as a solution.

PST is designed to teach coping and problem-solving skills and adaptive behaviors, and as a result, it may help participants improve personal and social resourcefulness, which may in turn help reduce depressive symptoms. However, no previous study examined the relationship between resourcefulness and depression and whether or not PST may indeed help improve personal and social resourcefulness. The purpose of the present study was to examine a possible connection between personal/social resourcefulness and depressive symptoms among low-income homebound older adults who participated in an RCT that tested the feasibility and preliminary evidence of efficacy of six sessions of telehealth PST (tele-PST; PST sessions conducted via Skype video calls), compared to six sessions of in-person PST or six sessions of telephone care call (attention control). Both PST treatment modalities followed the PST-PC manual. (The term "PST," rather than "PST-PC," was used throughout the project for the sake of simplicity for depressed, low-income homebound older-adult participants.) Our earlier paper (Choi, Hegel, Marti, et al., 2012) reported that tele-PST was as efficacious as in-person PST and that the tele-PST and in-person PST participants' depressive symptoms at a 12-week follow-up were significantly lower than those of telephone care call participants and the treatment effects were maintained at a 24-week follow-up. In the present study, the relationship between resourcefulness and depression outcomes in the RCT was tested with two hypotheses: (H1) personal and social resourcefulness would be significantly associated with depression outcomes at postintervention, controlling for depressive symptoms and resourcefulness at baseline; and (H2) the treatment effect of PST on depression would be mediated by the participants' personal resourcefulness and social resourcefulness.

The RCT was the first test of home-based, televideo delivery of PST for low-income homebound older adults facing barriers to accessing psychotherapy in both specialty care and primary care settings due to their mobility impairment. In-person PST is extra costly for homebound persons given the need to transport disabled individuals to outpatient settings or therapists to individuals' homes. Despite multiple efficacy studies of televideo and telephone psychotherapy, there is not enough data on the feasibility and efficacy of either modality for older adults (Grady et al., 2011). Based on the preliminary evidence of efficacy of tele-PST and in-person PST for low-income homebound older adults, the present study further examined the questions of whether or not the levels of personal and social

resourcefulness were associated with the depression outcomes and whether or not the effect of PST may have been mediated by personal and social resourcefulness.

Method

RECRUITMENT PROCESS AND PARTICIPANTS

Case managers at a large Meals on Wheels program and other agencies serving low-income homebound adults in central Texas referred to the project home-bound adults who met the following inclusion criteria: age 50 years or older and English speaking, with depressive symptoms as identified by either a score of 10 or higher on the Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002) or upon the case managers' clinical impressions. (The PHQ-9 was not administered in situations where a client's privacy was not ensured.) The 50 to 64 age group was included in the study based on the high rate of depression among this age group of disabled, homebound adults in our previous study (Choi, Teeters, Perez, Farar, & Thompson, 2010). The study procedures, including assessments and random assignments, were explained to each referred individual. Those who provided written informed consent, approved by the first and second authors' university IRB, were administered the 24-item Hamilton Rating Scale for Depression (HAMD) and other screening measures. Those whose HAMD scores were 15 or higher and met the following criteria were included in the RCT: no reported suicidal ideation/plans, no probable dementia, absence of bipolar disorder, absence of current (12-month) or lifetime psychotic symptoms or disorder, absence of co-occurring alcohol or other addictive substance abuse, and no current involvement in psychotherapy. The Mini-Cog consisting of a composite three-item recall and clock-drawing test was used for dementia screen (Borson, Scanlan, Brush, Vitaliano, & Dokmak, 2000). Possible bipolar disorder was assessed using the Mood Disorder Questionnaire (Hirschfeld et al., 2000, 2003). Psychotic symptoms or disorder was assessed with the Psychosis Screen from the World Mental Health Composite International Diagnostic Interview 3.0 (World Health Organization, 2005). Co-occurring alcohol or other addictive substance abuse was assessed with CAGE-AID (Brown & Rounds, 1995). Those who had been on antidepressant medication for more than 2 months but still showed significant depressive symptoms were not excluded from the study. All those who were eligible for the RCT group assignment were also administered the depression module of the Structured Clinical Interview for DSM (SCID), which maps onto the DSM-IV-TR. All the assessments were conducted in person, in home by four master's-level social workers who were specifically trained in all the study instruments by a Ph.D.-level clinical psychologist. The assessors were not blind to the participants' group assignments as some questions were specific to the group (e.g., technology assessment for the tele-PST group), but they were blind to the study hypotheses.

As shown in Figure 1, of 186 referrals received and assessed for eligibility during the 24-month recruitment and enrollment period, 124 met the inclusion criteria and 121 who agreed to participation in the study were randomly assigned to three groups: in-person PST ($n = 42$, 35%), tele-PST ($n = 43$, 35%), and telephone care calls ($n = 36$, 30%). Fourteen participants dropped out of the study before completing six sessions of in-person PST ($n = 7$), tele-PST ($n = 5$), and telephone care calls ($n = 2$), and 1 telephone care call participant dropped out before 12-week follow-up. Of the 106 participants who completed their 12-week follow-up assessment, 10 did not complete the 24-week follow-up. Attrition was due mostly to deteriorating health problems that resulted in hospitalization, nursing home placement, and death; however, the baseline demographic and clinical characteristics, including HAMD and resourcefulness scores, of the dropouts did not significantly differ from those who continued in the study.

THERAPIST TRAINING, SUPERVISION, AND FIDELITY MONITORING

The last author (MTH) trained two licensed master's-level social workers in PST-PC and provided them ongoing clinical supervision and fidelity monitoring. The latter was done with a review of the audio recordings of two sessions (the first session and one random selection between the second and fifth sessions) from 20% of all participants throughout the study. All tele-PST sessions were automatically recorded using MP3 Skype Recorder software downloaded (free of charge) on the therapists' desktop computers, while all in-person PST sessions were recorded with microcassette recorders. Each therapist provided both tele-PST and in-person PST. The mean global adherence and competence rating score on the PST-PC Therapist Adherence and Competence Scale (Hegel, Dietrich, Seville, & Jordan, 2004) was 4.4 on a 6-point scale (0 = *very poor* to 5 = *very good*), with no significant difference between the two therapists.

CONDUCT OF PST SESSIONS AND ATTENTION CONTROL

In each 60-minute PST session, the therapist and participant used a worksheet to progress through the seven steps of PST: (1) identifying and clarifying a problem area; (2) establishing clear, realistic, and achievable goals for problem resolution; (3) generating multiple solution alternatives or appropriate solution possibilities through brainstorming; (4) implementing decision-making guidelines through identifying pros and cons of each potential solution (e.g., advantages and disadvantages, feasibility and obstacles, and other benefits and challenges); (5) evaluating and choosing solutions by comparing and contrasting them; (6) developing an action plan detailing steps the client would take to implement the preferred solutions; and (7) evaluating the outcome and reinforcement of success and continued effort.

Participants in the telephone care call group received six weekly, 30-minute support calls from two licensed master's-level social workers who were not trained in PST or any other evidence-based depression treatment intervention modality. The purpose of the calls was not to provide active treatment but to provide generic support and empathy and to monitor the participants' depressive symptoms to ensure their safety. The support callers were monitored and supervised by the first author using the progress notes for each call. Fidelity checks based on the progress notes revealed no evidence that active treatment components (e.g., problem-solving skills, cognitive restructuring, behavioral activation) were being provided. The study protocol for the case of worsening symptoms was, with the participant's consent, to inform his or her primary care physician for medication adjustment. Both participants and their case managers were also provided with a resource list containing specialty mental health care providers (names, contact information, location, and acceptable payment type) that was compiled by the study investigators. However, follow-up assessment data showed only a couple of them utilized specialty mental health providers. The primary barriers were the lack of transportation and inability to afford the copay, even for those with Medicare.

Measures

DEPRESSIVE SYMPTOMS

The 24-item HAMD consists of the GRID-HAMD-21 structured interview guide (Depression Rating Scale Standardization Team, 2003) augmented with three additional items assessing feelings of hopelessness, helplessness, and worthlessness with specific probes and follow-up questions developed by Moberg et al. (2001). The scoring format of the three additional questions was slightly modified to allow both frequency and intensity of these feelings to be factored in their ratings as in the case with other comparable items (e.g., depressed mood, anxiety) in the GRID-HAMD-21. The HAMD was administered at

baseline and at 12-week (2 weeks after the completion of six PST sessions) and 24-week follow-ups.

PERSONAL AND SOCIAL RESOURCEFULNESS

The 28-item Resourcefulness Scale for Older Adults (RSOA), which measures personal and social resourcefulness in older adults, has been found reliable and valid (Zauszniewski, Lai, & Tithiphontumrong, 2006). The RSOA includes subscales measuring both self-control/problem solving and social resourcefulness. The 16-item personal resourcefulness subscale derived from the Self-Control Schedule (Rosenbaum, 1980) measures self-control and self-efficacy, with specific items on systematic problem solving; consideration of alternatives; planning of behavior; thinking about pleasant events; keeping busy; and record keeping. The 12-item social resourcefulness scale measures older adults' ability to seek help from others when unable to function independently and their comfort in seeking and using necessary resources. Although these two subscales measure self-control and help-seeking behaviors, they contain many items measuring problem orientation and ingrained values and beliefs in the face of stressful events (e.g., positive thinking, overcoming failure, impulse control, expressing feelings to others, borrowing money from others). Each item was measured on a 6-point scale (0 = *not at all like me* to 5 = *very much like me*), with the maximum possible scores being 80 for personal resourcefulness and 60 for social resourcefulness. The higher scores represent greater resourcefulness. The Cronbach's alphas for the personal resourcefulness scale and the social resourcefulness scale for the study sample was .83, and .74, respectively, at baseline, .77 and .73 at 12-week follow-up, and .87 and .80 at 24-week follow-up.

DEMOGRAPHIC CHARACTERISTICS

Demographic variables that were tracked included age, gender, race/ethnicity, and the number of diagnosed chronic illnesses reported by the participants—arthritis, hypertension, diabetes, heart disease, stroke, lung disease, cancer, and kidney disease. Only those conditions that were still problems were counted.

Analysis Methods

First, the participants' demographic characteristics, HAMD scores, and personal and social resourcefulness scores presented. Then the following analytic steps were taken to test the study hypotheses.

MIXED MODELS

To assess the postintervention association between personal and social resourcefulness and depression outcomes, mixed models were fit using SAS 9.2 PROC MIXED in which time points were nested within participants, which accounts for autocorrelation within participants. All models contained a random intercept. The 12- and 24-week follow-up HAMD scores were dependent variables, with the 12- and 24-week personal and social resourcefulness scale scores and time (in weeks) since baseline as time-varying covariates, and the baseline HAMD and personal and social resourcefulness scores and the RCT group assignment as time-invariant covariates. In order to identify the model that best fits the longitudinal trend of the outcome, an unconditional mixed model was compared with linear and nonlinear growth models, using the Akaike Information Criterion with correction (AICc) following recommendations from Singer and Willett (2003). Models with AICc values that differ by less than two are treated as equivalent (Burnham & Anderson, 2002), and the most parsimonious model is selected when AICc differences are less than two. Intervention condition was modeled using two dummy variables that indicated whether the participant was in either the in-person PST or the tele-PST group (intervention group = 1;

control group = 0). Effect sizes equivalent to a Cohen's *d* were estimated by dividing the coefficients for group differences by the baseline raw standard deviation of the outcome following Feingold's (2009) recommendations for group difference effect sizes in longitudinal mixed models.

MEDIATION ANALYSIS

Mediation was assessed in a latent growth curve (LGC) model framework implemented using the Mplus (Muthén & Muthén, 2010). Mediation in the LGC context models parallel change in the mediator and outcome variables where mediation is assessed as the indirect path from the intervention condition to the change in the mediator and change in the mediator to change in the outcome (MacKinnon, 2008). Following MacKinnon's recommendations, the following tests were conducted to examine whether or not (a) the intervention predicts the outcome (i.e., HAMD), (b) the intervention predicts the mediator (either personal or social resourcefulness scores), and (c) the change in the mediator predicts the change in the outcome. The indirect effect from the independent variable to the dependent variable through the mediator was assessed using bias-corrected bootstrap estimates, which test the null hypothesis that the mediation effect is zero (i.e., the product of the intervention to the mediator and the mediator to the outcome paths is zero). The pattern of the change in the mediator and the outcome was determined by comparing growth models in the same manner as described for the mixed models above. Growth models comprise two latent variables that represent initial status and growth rate. After establishing the growth models for the mediator and the outcome, the growth factor of the mediator was regressed on the initial status of the outcome and the intervention condition dummy variables. The growth factor of the outcome was regressed on the initial status of the mediator, the slope of the mediator, and the intervention condition dummy variables. Model fit was assessed using the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR), using the following cutoff values: RMSEA less than .05 (MacCallum, Browne, & Sugawara, 1996), a CFI greater than .95 (Hu & Bentler, 1998), and an SRMR value less than .08 (Hu & Bentler).

MISSING DATA

For mixed models, missing data were replaced with imputed values using multiple imputation that was implemented using the Amelia package of the R project (Honaker, King, & Blackwell, 2010). Both nonmissing cross-sectional and longitudinal data were used to impute plausible values for missing data with a bootstrap method that simulates uncertainty in the missing values. Missing values were imputed in 20 data sets that were analyzed using the mixed model described above. After each data set was analyzed, parameters and standard errors were combined using SAS PROC MIANALYZE to generate inferential statistics for averaged parameters and standard errors that were combined to represent within and between analysis variability using Rubin's (1987) formulas. For mediation models fit in Mplus, missing data were accounted for by direct maximum likelihood, which incorporates all available data in the observed information matrix (Kenward & Molenberghs, 1998). Both multiple imputation and direct maximum likelihood are considered optimal techniques for the analysis of data with missing values (Graham, 2009).

Results

PARTICIPANT CHARACTERISTICS

Table 1 shows that the study participants at baseline were between ages 50 and 89 years (31.4% between 50 and 59 years, 39.7% between 60 and 69 years, 19.8% between 70 and 79 years, and 9.1% between 80 and 89 years); 77.7% were female; 58.7% were Black or

Hispanic; 84.3% had annual family income of \$25,000 or less; 67% met the DSM-IV-R diagnostic criteria for major depressive disorder (25.6% single episode and 41.4% recurrent episode); and 59.5% reported that they had used mental health services in the preceding 12 months for depression, anxiety, or both. Further analysis of these recent mental health care users showed that 79.2% consulted their primary care physician, 20.8% received counseling from a psychologist or a social worker, 19.4% saw a psychiatrist, and 1.4% ($n = 1$) consulted a clergy. For all types of outpatient mental health care, 51.4% had three or fewer visits. The participants had, on average, three chronic illnesses. Further analysis found no significant difference among three RCT groups in any baseline demographic and clinical characteristic, including resourcefulness and HAMD scores. No significant difference was found in baseline resourcefulness and HAMD scores by gender, age, race/ethnicity, and income.

Table 2 shows that all three groups appear to have slightly higher resourcefulness scores at 12- and 24-week follow-ups than at baseline, although no significant RCT group difference was found in the change scores. Further analysis using a pairwise t test also found that the increase in personal and social resourcefulness scores since baseline was not significant for any group, while the increase in the combined personal and social resourcefulness scores since baseline was significant among in-person PST participants only ($t = 2.305$, $p = .027$) at 12-week follow-up. Further analysis found no significant correlation between HAMD scores and personal and social resourcefulness scores at baseline. However, at 12- and 24-week follow-ups, significant negative correlations ($r = -.30$, $p = .002$ at 12-week; $r = -.27$, $p = .009$ at 24-week) were found between HAMD scores and personal resourcefulness scores, whereas the correlations were not significant between HAMD scores and social resourcefulness scores. Personal and social resourcefulness scores were moderately positively correlated with one another at baseline and 12- and 24-week follow-ups ($r = .24$, $p = .007$; $r = .35$, $p < .001$; and $r = .27$, $p = .007$, respectively).

MIXED-MODEL RESULTS: RELATIONSHIP BETWEEN RESOURCEFULNESS AND DEPRESSION

According to the AICc comparisons between the unconditional growth model and the linear and nonlinear models, with the 12- and 24-week HAMD scores as the dependent variables, the unconditional model was equivalent to the linear and nonlinear models and it was the most parsimonious one for the longitudinal outcome data. Thus, the unconditional model was retained as the final model. This reflects the fact that the HAMD scores were relatively stable in the two follow-up periods and thus do not warrant a parameter for change across time.

With respect to the test of H1, Table 3 shows that there was a significant main effect for personal resourcefulness as a time-varying covariate, $t(642) = -3.34$, $p < .001$, while no such effect was found for social resourcefulness. In addition, the findings show that baseline personal and social resourcefulness scores were not associated with depression outcomes at postintervention. Table 3 also shows that there was a significant main effect for tele-PST, $t(1933) = -2.59$, $p = .009$, and for in-person PST, $t(3009) = -2.38$, $p = .017$. We estimated a single effect size for both the 12- and 24-week follow-ups as there was not a significant effect for time, indicating that the effects were constant across time. The effect-size estimate for tele-PST versus telephone care call was .53 and the effect-size estimate for the comparison between in-person PST and care call group was .45. Further analysis found that at 24-week follow-up, HAMD scores of 48.5% of tele-PST participants, 42.4% of in-person PST participants, and 27.6% of telephone care call participants were at least 50% lower than their baseline HAMD scores.

MEDIATION EFFECT

The factor loadings for the initial status latent variable were fixed at [1 1 1] for the baseline, 12-week, and 24-week follow-up measures. As with the mixed models, a model of static change for both the outcome and the mediators was the best fit to the data, which reflects that these variables were relatively constant in the 12- and 24-week follow-up measures. The factor loadings for the growth factor latent variable were thus set to model static change [0 1 1] and thus, the growth factor represents a difference between baseline and the average effect of the 12- and 24-week follow-up measures. The personal resourcefulness mediation model exhibited good fit (RMSEA = .00, CFI = 1.00, SRMR = .06). A significant direct effect on the HAMD growth factor was found for the tele-PST versus telephone care call contrast ($p = .029$), and a marginally significant effect was found for the in-person PST versus telephone care call contrast ($p = .078$). No significant direct effect on the personal resourcefulness growth factor was found for the tele-PST versus telephone care call contrast ($p = .736$) or the in-person PST versus telephone care call contrast ($p = .712$). The direct effect of the mediator on HAMD was not significant ($p = .200$), either. The bias-corrected bootstrap confidence interval for the indirect effect from tele-PST to HAMD through the personal resourcefulness growth factor [-11.81, 2.48] and the indirect effect from in-person PST to HAMD through the personal resourcefulness growth factor [-12.58, 2.47] confirmed that there was no mediation.

In the social resourcefulness mediation model, significant direct effects on the HAMD growth factor were found for the tele-PST versus telephone care call contrast ($p = .002$) and for the in-person PST versus care group contrast ($p = .017$). No significant direct effect on the social resourcefulness growth factor was found for the tele-PST versus telephone care call contrast ($p = .640$) or the in-person PST versus telephone care call contrast ($p = .408$). The direct effect of the mediator on HAMD was not significant ($p = .526$), either. The bias-corrected bootstrap confidence interval for the indirect effect from tele-PST to HAMD through the personal resourcefulness growth factor [-1.12, 8.16] and the indirect effect from in-person PST to HAMD through the personal resourcefulness growth factor [-7.38, 1.07] confirmed that there was no mediation.

Discussion

This study examined the relationship between personal and social resourcefulness and depressive symptoms and the potential mediation effect of personal and social resourcefulness on the depression outcomes of PST among low-income home-bound older adults. As discussed, our previous study found that those who participated in six sessions of in-person PST or tele-PST, as opposed to those who received telephone care calls providing nonspecific support, had significantly lower depressive symptoms at 12-week follow-up and the HAMD scores remained stable at 24-week follow-up (Choi, Hegel, Marti, et al., 2012). The findings of the present study show that the personal resourcefulness scores at follow-ups were significantly negatively associated with the HAMD scores at follow-ups. However, neither personal nor the social resourcefulness scores were significantly associated with the intervention group assignment, and further test of the mediation effect of the resourcefulness confirmed the lack of such effect. The results provide partial support of H1 (direct relationship between resourcefulness and depressive symptoms at postintervention) but no support for H2 (mediating effect of personal and social resourcefulness on depressive symptoms).

The direct inverse relationship between personal resourcefulness scores and depressive symptom outcomes, regardless of the intervention modality, suggests that participation in the RCT, in itself, may have allowed some older adults' perceived sense of self-control and self-efficacy to increase. Previous studies of the development of coping resources in

adulthood also found that while stress was negatively associated with instrumental action, the use of instrumental action was positively associated with both positive outcome and mastery, which in turn were strongly associated with current levels of depression (Aldwin, 2007; Aldwin, Sutton, & Lachman, 1996). Participation in our study was a voluntary, instrumental action that these older adults took with the hope of reducing their depressive symptoms. Even though the receipt of telephone care calls was not likely to have improved the participants' problem-solving skills, it may still have afforded them the perception of personal resourcefulness because they had engaged in help-seeking action—participating in a study and talking to others about their depressed mood and other things that were on their mind. An absolute majority of older-adult participants in the RCT were low income, and their prior depression treatment consisted mostly of antidepressant medication. Participation in the study and interacting with a professional on a regular basis may also have been a form of behavioral activation for socially isolated, homebound individuals. In fact, many participants who received telephone care calls stated that they looked forward and enjoyed talking to the caller who provided positive regard and empathy. This behavioral activation and reduced sense of social isolation may have contributed to reduced depressive symptoms and the sense of personal resourcefulness among the telephone call recipients (see Cuijpers, van Straten, & Warmerdam, 2007a; Dimidjian et al., 2006; Hopko, Lejuez, Ruggiero, & Eifert, 2003).

The lack of significant direct relationship between social resourcefulness and the depression outcomes may reflect the limited tangible and intangible resources that are available to low-income home-bound older adults. Most of these low-income older adults had already asked for assistance and, as a result, could have been aware of the limited scope of resources (i.e., case management, financial aid, living arrangement/housing support, and transportation and other instrumental support) for those living with chronic illnesses, disability, and limited financial means. Our earlier study (Choi et al., 2012) found that the older-adult participants in PST who sought formal and informal help for financial issues, living arrangement/housing problems, and neighborhood safety issues as part of their PST could not resolve their issues because of limited scope and availability of financial aid, subsidized rental units, and stepped-up law enforcement for neighborhood safety. Many study participants also stated that they would never borrow money from others and rarely asked others to help except in some crisis situations (i.e., social resourcefulness items) as these kinds of help seeking went against their values and beliefs concerning self-sufficiency and decency. Overall, most participants stated that they were reluctant to seek help for their instrumental and emotional needs, especially from their informal support systems, as they could not reciprocate the help that they might receive and did not want to be a burden on their loved ones.

Despite the finding that the study participation itself may have been beneficial, the results show that participation in PST, whether in person or via videoconferencing, was significantly more beneficial than participation in telephone care calls in reducing depressive symptoms. Apparently, learning and applying systematic and rational problem-solving skills contributed more to improving depressed mood than talking to an empathic, supportive listener. Thus, the negative findings regarding the mediation effect of personal and social resourcefulness on depressive symptom scores may be attributable to the following reasons. First, given that resourcefulness was measured only 12 and 24 weeks after baseline, PST's effect on self-control and help-seeking behaviors, problem orientation, and ingrained values and beliefs may not have taken root. A longer period of practicing systematic problem-solving skills may be needed to impact one's resourcefulness, measuring not only self-control and help-seeking behaviors but also problem orientation and ingrained values and beliefs. Especially given that the participants were low-income, largely racial/ethnic minority homebound older adults who were likely to have had many disappointments and

rejections from previous help-seeking attempts, they may have been cautious about asking for help and may have needed more time to feel comfortable with help seeking. A previous study found that minority older adults who had experienced discrimination had adopted a more self-reliant attitude regarding help seeking for their mental health problems (Woodward, Chatters, Taylor, Neighbors, & Jackson, 2010).

Second, with self-efficacy being a key element of PST, reduced depressive symptoms and increased self-efficacy from problem-solving skills training may have reduced the participants' felt or expressed need for help seeking. PST may have reinforced these low-income older adults' self-reliance and resilience in the face of adversities rather than helping them become better help seekers. A recent study of community-dwelling adults ages 50 years and older found that depression and resilience were the two most powerful factors affecting self-perceptions of successful aging, with depression negatively and resilience positively affecting such perceptions (Jeste et al., 2013).

Third, we speculate that the lack of a mediation effect by personal and social resourcefulness may also be a problem of measurement. As found in previous studies, PST sessions improve problem-solving skills, but not problem orientation (Kant et al., 1997). As described, personal and social resourcefulness scales are designed to measure self-control and help-seeking behaviors as well as problem orientation and ingrained values and beliefs, but they may not have been able to capture improved problem-solving skills, especially in the domains of self-control, and help-seeking behaviors, that were attributable to PST per se or to PST specifically in this group of low-income homebound older adults.

This study had a few limitations. First, the sample size was relatively small and the sample was limited to one geographic area. Second, the 12- and 24-week follow-ups may not have allowed enough time for capturing longer-term changes, if any, in both depression outcomes and personal and social resourcefulness as potential mediators. Third, compared with in-person PST and tele-PST, weekly telephone care calls were shorter in duration (up to 30 minutes). Future studies of PST's effectiveness need to include a larger sample from multiple sites, long-term follow-up, and a control condition that is equivalent in therapeutic dose.

Despite these limitations, this study has many strengths as it targeted an extremely vulnerable population, included a diverse sample in age, gender, and racial/ethnic distributions, and it attempted to evaluate personal and social resourcefulness as potential mediators of an efficacious intervention that could be sustained in the real world. The study contributes to the knowledge base regarding psychosocial interventions for late-life depression, especially among low-income homebound older adults who have been underexposed in research on depression, coping, and treatment and have limited access to psychotherapy as a treatment modality. The negative findings of mediating effect highlight the challenges related to these mostly racial/ethnic older adults who had largely been excluded in previous research and underscore the need for continued research to answer the question of why and how tele-PST or in-person PST may work for them. PST, especially tele-PST, has the potential to become a clinically and cost-effective depression treatment for a growing number of homebound older adults and other persons who are disabled. Further research is needed to identify the pathways and mechanisms of this potentially effective depression treatment for low-income homebound older adults with limited access to other psychotherapy modalities.

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FIGURE 1.
CONSORT flow diagram for RCT participants

Table 1**Demographic and Clinical Characteristics of Participants at Baseline ($n = 121$)**

Age, mean (<i>SD</i>) (range: 50–89)	65.21 (± 9.22)
Gender (n , %)	
Male	27 (22.3)
Female	94 (77.7)
Race/ethnicity (n , %)	
Non-Hispanic White	50 (41.3)
Black	41 (33.9)
Hispanic	30 (24.8)
Marital status (n , %)	
Married	21 (17.4)
Widowed	27 (22.3)
Divorced/separated	58 (47.9)
Never married	15 (12.4)
Living arrangement (n , %)	
Living alone	77 (63.6)
Not living alone	44 (36.4)
Family income (n , %)	
$\leq \$15,000$	77 (63.6)
\$15,001–25,000	25 (20.7)
\$25,001–50,000	12 (9.9)
Don't know/refused	7 (5.8)
SCID diagnosis (n , %)	
Major depressive disorder	81 (67.0)
Depressive disorder, NOS	35 (28.9)
Dystymia	5 (4.1)
No. of diagnosed medical conditions, mean (<i>SD</i>)	3.19 (± 1.54)
Depression severity (HAMD score), mean (<i>SD</i>) (range: 15–42)	24.55 (± 6.62)
History of mental health care service use (n , %)	
Used at least once in lifetime	103 (85.1)
Used at least once in the past 12 months	72 (59.5)
RCT group (n , %)	
Tele-PST	43 (35.5)
In-person PST	42 (34.7)
Telephone support call	36 (29.8)

Note. HAMD = Hamilton Rating Scale for Depression; PST = Problem-solving therapy; RCT = Randomized controlled trial; SCID = Structured Clinical Interview for DSM.

Table 2

Resourcefulness Characteristics by Group Assignment

	In-person PST	Tele-PST	Telephone care call	<i>p</i>
Baseline				
Total resourcefulness	79.58 ± 15.92	82.97 ± 21.40	82.70 ± 18.12	.695
Personal resourcefulness	51.33 ± 12.39	51.32 ± 14.17	52.30 ± 14.55	.944
Social resourcefulness	28.25 ± 10.51	31.65 ± 11.37	30.39 ± 10.65	.406
12-week follow-up				
Total resourcefulness	85.58 ± 18.33	84.89 ± 21.79	85.88 ± 16.46	.975
Personal resourcefulness	54.56 ± 11.10	54.38 ± 12.92	54.00 ± 11.98	.981
Social resourcefulness	31.03 ± 11.37	30.51 ± 12.63	31.88 ± 9.13	.877
24-week follow-up				
Total resourcefulness	85.41 ± 22.90	82.18 ± 23.34	83.00 ± 24.27	.843
Personal resourcefulness	54.15 ± 14.35	52.06 ± 14.96	53.57 ± 15.90	.795
Social resourcefulness	31.26 ± 12.86	30.12 ± 13.40	28.38 ± 10.48	.654

Table 3

Parameter Estimates for Mixed-Model Testing Association Between Resourcefulness and Depression at Postintervention

Parameter	Estimate	Standard error	<i>t</i>	<i>p</i>
Intercept	13.98	3.55	3.94	<.001
In-person PST	−3.05	1.28	−2.38	.017
Tele-PST	−3.38	1.30	−2.58	.009
HAMD baseline	0.53	0.08	6.56	<.001
Personal resourcefulness baseline	0.04	0.05	0.83	.408
Social resourcefulness baseline	−0.09	0.06	−1.48	.139
Personal resourcefulness since baseline	−0.16	0.05	−3.34	<.001
Social resourcefulness since baseline	0.06	0.05	1.13	.260
Time (week) since baseline	−0.11	0.06	−1.75	.081

Note. HAMD = Hamilton Rating Scale for Depression; PST = Problem-solving therapy.