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Problem solving therapy reduces subjective burden levels in caregivers of family members with mild cognitive impairment or early-stage dementia: Secondary analysis of a randomized clinical trial

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Abstract

OBJECTIVES: Interventions addressing burden have limited impact among long-term family caregivers. We examined whether problem solving therapy (PST) would reduce burden levels of caregivers of individuals diagnosed with mild cognitive impairment (MCI) or early-stage dementia (AD).

METHODS: Caregivers (N = 73) randomly received PST or nutritional training (NT). Burden measures were assessed over one-year post-intervention.

RESULTS: Relative to NT, caregivers receiving PST endorsed improved perceived burden levels over time, regardless of the type of caregiver. Distress over the care recipient's dementia-related behaviors remained low over time among MCI caregivers receiving PST, while these burden levels among MCI caregivers receiving NT rose over time. AD caregivers receiving PST endorsed reductions in these burden levels over time, while AD caregivers in the NT group endorsed higher burden levels over time.

CONCLUSION: PST, taught early in the caregiving trajectory, improves subjective burden levels among caregivers of family members with relatively mild cognitive deficits.

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Keywords

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1. INTRODUCTION

In 2016, an estimated 5.4 million Americans had Alzheimer's disease and other forms of dementia and more than 15 million family members and friends (mainly spouses and adult children) provided unpaid care and assistance to these individuals.¹ Many family dementia caregivers feel overwhelmed by the impact of the experience of caregiving and of major disruptions in their established life style and their life goals and dreams.² They are often distressed by disruptions in their relationship with the ill person and their own emotional responses when confronted with, for instance, bothersome or embarrassing dementia-related behaviors.^{3,4} Additionally, the family member with dementia may be unsympathetic or ungrateful with a loss of reciprocity in the relationship.⁵

Decades of research indicates that caring for a family member with dementia is extremely burdensome or stressful, and contributes to caregiver illness (mental and physical) and diminished quality-of-life.^{6–15} This knowledge laid a foundation for studies designed to evaluate the effects of interventions designed to support family dementia caregivers to provide care and cope more effectively.¹⁶

Numerous studies have evaluated various types of interventions designed to improve mental health outcomes among dementia family caregivers. Yet to date, these interventions have been only moderately effective at alleviating burden and distress (i.e., depression and anxiety symptoms) in dementia family caregivers.^{17–26} A possible reason for the limited impact may lie in the fact that interventions are often evaluated with caregivers who have already served in the caregiving role for years and who report high levels of burden. Indeed, meta-analyses of caregiver interventions show that the effectiveness of dementia caregiver interventions declines as levels of pre-intervention burden increase.⁹ An alternative strategy would be to intervene early with family members, while their burden levels are relatively low, in order to prevent the development or worsening of burden. It is possible that interventions to promote adaptive coping may positively affect the mental health of family members if they are offered relatively early in the caregiving trajectory.

A meta-review of dementia caregiver interventions published from 1988 to the end of 2014 (including 31 systematic reviews of intervention studies) concluded that most interventions provided education about dementia and taught the caregiver coping strategies for the “general stress” associated with caregiving, without delving into specific coping strategies.⁹ Yet, the review also suggests that coping strategies are important when considering caregiver burden levels. Coping strategies that involve a problem focus, acceptance, and social-emotional support have a positive influence on caregiver burden levels; whereas, wishful thinking, denial and avoidance coping strategies are associated with higher caregiver burden levels.⁹

Meta-analyses support the efficacy of PST as an empirically validated treatment for depression.^{27–30} Regarding family caregivers, PST-based interventions show positive mental health outcomes (e.g., lower burden or depression levels, improved QOL) among mothers of children with cancer,³¹ family caregivers of individuals with traumatic brain injury,³² family caregivers of patients with a spinal cord injury³³ and family caregivers of stroke survivors.³⁴ Yet, no studies have been conducted to determine if a PST-based intervention reduces burden levels among caregivers of family members with potentially progressive mild cognitive deficits or are in the early stages of dementia.

Reported here are the effects of Problem-solving therapy (PST) on burden (secondary) outcomes from a previously published (NIMH-funded) trial where the primary outcomes were psychiatric morbidity (depression and anxiety levels), along with problem solving skill levels and problem orientation. Since PST improves depression symptom levels and improves negative problem orientation in co-residing caregivers of persons given a recent Alzheimer's Disease Research Center (ADRC) diagnosis of mild cognitive impairment (MCI) and early-stage dementia,³⁵ the current analysis was conducted to determine if PST also positively impacts subjective caregiver burden levels in these relatively new family caregivers.

In the current study, we postulated that enhanced problem-solving skill training, learned early in the caregiving trajectory (when burden levels are relatively low) would result in improved subjective burden levels (i.e., whether caregiving responsibilities were perceived to be burdensome among their family caregivers), even if objective burden (actual tasks required to be performed) did not change over one-year of follow-up. Since learning problem solving skills may be conceptualized as a coping resource, we hypothesized that family caregivers receiving PST would exhibit lower mean levels of subjective caregiving burden than family caregivers receiving the comparison intervention (e.g., nutritional training or NT) at one-, three-, six-, and 12-months after the intervention.

2. METHODS

2.1. Study Participants

The University of Pittsburgh Alzheimer's Disease Research Center (ADRC) research registry was searched for all cases of MCI diagnosed in the six months before the start of data collection and all new cases of MCI or early-stage dementia (any type) diagnosed during the subsequent 46-month period of study participant enrollment. MCI is diagnosed when there is expressed concern (by the individual or others) and there is documented cognitive impairment greater than expected for a person's age and education in one or more cognitive domains. For a diagnosis of dementia, the affected person shows evidence of deficits in two or more cognitive domains, and activities of daily living are affected.^{36, 37} Caregivers were eligible for study participation if they were an adult, lived within a 300-mile radius of the study site, communicated in English, and lived with the person given a new ADRC diagnosis of MCI or dementia (any type) with a Clinical Dementia Rating score of 0.5 to 1 (mild or early-stage dementia).³⁸

2.2. Design

This study used a 2-group randomized design. Randomization to the groups was 1:1 using a computer-generated random assignment sequence using permuted blocks of eight.

2.3. Procedures

After providing written informed consent and baseline data, caregivers were randomly assigned to the experimental problem-solving intervention (PST) or a comparison (nutritional training or NT) intervention.

2.3.1. Treatment protocol—The nine-session PST and NT protocols were carefully matched for the amount of time and attention each study participant received. The protocol consisted of two phases of treatment; the first phase was delivered face-to-face in the caregiver's home on six separate occasions approximately 2 weeks apart, each session lasting approximately 1.5 hours. The second phase occurred immediately after phase one and included three telephone contacts (approximately 2 weeks apart) to reinforce principles (of PST or NT) taught during the in-home training sessions, each lasting approximately 45 minutes.³⁵ No PST or NT booster sessions were included in the protocol. Participants were asked to keep a record of PST or NT-related efforts between sessions and questions they had related to the application of PST or NT. These records were used as a basis for discussion during both phases of the intervention. The interventionists were trained healthcare professionals (social workers, nurses) and separate interventionists administered the PST and NT protocols to prevent cross-contamination.³⁵

2.3.2. Experimental Intervention—The PST intervention focused on training family caregivers of persons with cognitive impairment in adaptive problem-solving attitudes and skills. The intervention was adapted from the work of Areán and colleagues, who developed a manualized protocol for PST use in primary care.³⁹ The protocol was adapted to enhance problem-solving attitudes and skill levels of family caregivers, as they began to face a variety of potential caregiving stressors.

PST sessions focused on problem orientation, use and control of emotions in problem-solving, problem definition and formulation, generation of alternative solutions, decision-making, solution implementation and verification, and maintenance of problem-solving skills. Together, the participant and interventionist completed the 7-steps to solving at least one problem together before beginning the second phase of the intervention. During the initial PST session, a list of 15 problems (Problem List) was used to generate possible problems to work on with the interventionist. The list includes problems with relationships, loneliness, sexual health, self-image, religion, moral values, work, finances, living arrangements, transportation, yours or your family's health, your behavior, the care recipient's behavior, new responsibilities (caregiving or household), problems with aging, and a lack of pleasurable activities.³⁹

2.3.3. Comparison Intervention—The comparison intervention was matched to the PST-based intervention in terms of number and duration of sessions and involved nutritional training (NT) based on the United States Department of Health and Human Services

(USDHHS) “2005 My Pyramid Dietary Guidelines for Americans over Age 50.”⁴⁰ We chose a nutrition-based comparison intervention because information about dietary practices was not likely to affect any psychosocial outcomes included in the trial.

2.4 Measures

Data were collected at baseline (T1), 1-month post-intervention (T2), 3-months (T3), 6-months (T4), and 12-months (T5) post-intervention. Demographic data and information about the caregiver (relationship to the care recipient, number of persons in the household, years in the relationship, employment status, and activity limitations due to illness) were collected, along with several measures of objective and subjective caregiver burden. Data were extracted from the ADRC patient registry on the care recipient’s cognitive diagnosis, age, gender, and employment status.

2.4.1 Caregiver Burden—Both objective and subjective caregiver burden were assessed. Objective burden refers to tasks required to care for the family member with dementia such as administering medications or providing transportation and/or time constraints related to such caregiving duties. Subjective caregiver burden is the extent to which the caregiver “minds” performing caregiving tasks.⁴¹ In other words, objective caregiver burden is associated with the practical consequences of physical and behavioral changes in the care recipient and events or activities associated with negative caregiving experience, whereas subjective caregiver burden refers to the emotional reactions of the caregiver such as frustration, worry, and/or exhaustion.⁴¹ We used two measures to assess elements of the caregivers’ objective burden: new household and personal management responsibilities (i.e., new caregiving tasks) and constraints on one’s lifestyle.

2.4.1.1. New Task-Related Responsibilities: Caregivers indicated which of 11 household and personal management tasks (e.g. preparing meals or doing laundry, running errands, making telephone calls, managing finances, home repairs) they performed on a regular basis. This set of items was adapted from the task burden list of Montgomery and associates.⁴¹ If the caregiver endorsed a specific task, follow-up items ascertained if they had ‘always done the task’ or ‘only since their loved one’s memory problems developed.’ The total number of new household and personal management tasks was summed.

2.4.1.2. Lifestyle Constraints: Montgomery’s Objective Caregiver Burden Scale⁴¹ was used to determine reported lifestyle constraints related to caregiving responsibilities (e.g. time, privacy, money, and leisure activities). Respondents rated eight items concerning the degree to which aspects of their life were affected by their family member’s cognitive impairment (1= little or no restriction; 5 = a large degree of restriction). Items are summed to yield a score ranging from 8 to 40, with higher scores indicating higher levels of lifestyle constraints. In the present sample, internal consistency reliability (Cronbach’s alpha) for the lifestyle constraint measure was .85.

2.4.2. Subjective caregiver burden—Two measures were used to assess elements of the respondents’ subjective burden: the caregiver’s reaction to frequently occurring

dementia-related behaviors in their loved one with cognitive impairment and perceived caregiver burden.

2.4.2.1. Reaction to Frequently Occurring Dementia-Related Behaviors: Respondents reported on their family member's behavioral status with the Revised Memory and Behavior Problem Checklist (RMBPC).⁴² First, the RMBPC inquires asks about the frequency of 24 behavioral problems commonly exhibited by individuals with dementia. Examples include sleep disturbances, lethargy and social withdrawal, restlessness, physical or verbal arguing/aggression, losing/destroying property, verbally disruptive behaviors (e.g., repeating questions, yelling), forgetting events, difficulty concentrating on a task, unable to start activities, appears sad or depressed (crying/tearful), or expresses feeling worthless or being a burden to others. Next, the RMBPC elicits information about the extent of the caregiver's reaction to such behaviors. Caregivers rate how much each of the dementia-related behaviors "bothered or upset" them (0 = not at all, 4 = extremely). An index is then computed to indicate how many of the frequently-occurring dementia-related behaviors (i.e., those that occurred weekly or more often) resulted in moderate to severe upset or bother in the caregiver (i.e., substantial burden associated with the behavior). The index demonstrated an internal consistency alpha of .91.

2.4.2.2. Perceived Caregiver Burden: We utilized Montgomery's Subjective Caregiver Burden Scale (SCBS)⁴ as an index of perceived caregiving burden. The SCBS includes 13 questions about caregiver perceptions of the caregiving role (e.g. "I feel that I don't do as much for my loved one as I could or should," "I feel that my spouse/family member tries to manipulate me," "I feel that giving help to my family member or spouse has enabled me to learn new skills") with responses ranging from 1 = never to 5 = almost always. To create a summary measure, positively worded items are reverse-scored and then all items are summed to yield a total score ranging from 13 to 65; higher scores indicate higher levels of perceived caregiving burden. Cronbach's alpha in the present sample was .73.

2.5. Statistical Analysis

Using an "intention-to-treat" (ITT) approach,⁴³ repeated measures linear mixed effects analysis was performed on each of four burden measures as outcomes: 1) new household and personal management tasks; 2) lifestyle constraints; 3) how many of the care recipient's common dementia-related behaviors distressed the caregiver; and 4) perceived caregiving burden. We examined the main and interaction effects for treatment group assignment (PST vs NT), type of caregiver (MCI versus dementia or AD), and time (baseline, 1-, 3-, 6-, and 12-month follow-up).

The PST and NT groups were compared on demographic characteristics and baseline burden levels with chi-square and t-tests. Due to skewed distributions, the "new task-related responsibility" and "dementia-related behavior burden" measures were log-transformed for the analyses. P values less than 0.05 were considered statistically significant.

We evaluated the potential for bias related to participant attrition from the study before conducting analyses of intervention effects. We found no differences in baseline characteristics, burden outcomes, or group assignment between participants with complete

follow-up data versus those who discontinued study involvement during the intervention phase of the study.

3. RESULTS

3.1. Study Sample

Details regarding the participants, recruitment, and retention are published elsewhere.³⁵ In brief, over a 46-month recruitment period, 191 individuals received a new ADRC diagnosis of MCI or early-stage dementia and 70% of them (n=134) had an eligible caregiver. Of those caregivers, 54% (n = 73) were enrolled and randomized. The sample of 73 participants consisted of 43 new MCI and 30 new dementia caregivers. Of these, five (6.8%) did not receive an intervention, 9 (12.3%) dropped out during the intervention phase of study, and five (6.8%) discontinued participation during the follow-up phase. More specifically, one participant did not receive any PST session (due to being “too stressed” to participate) and four participants did not receive any NT session (one was no longer caregiving, one was “too stressed,” one was “too ill” and one wanted PST). Regarding the follow-up assessments, two caregivers in the PST group and three caregivers in the NT group discontinued study participation over the one-year of follow-up. The most common reason for discontinuing study participation was illness in the caregiver or care recipient. Overall, a total of 19 participants (26%) were lost to attrition (but were included in analyses until the point of loss).³⁵

The majority of the participants were spousal caregivers (n = 55, 57.3%) of a family member with a new MCI diagnosis (n = 43, 58.9%). The participants were predominantly female (n = 57, 78.1%), Caucasian (n = 72, 98.6%) and well-educated caregivers (53.4% had a college education) with an average age of 65 years old (± 11.1 years, 27–84 years old). Most of the sample lived alone with the care recipient (n = 51, 69.8%) and had been in a relationship with the care recipient from 3–60 years (average 34.8 ± 17.3 years). More than half of the sample (n = 41, 56.2%) was employed, even though many caregivers (n = 42, (57.5%) acknowledged having an illness that limits their activity level. Demographic and background characteristics were similar among caregivers in the two intervention conditions, except that, caregivers in PST group were more likely than those in the NT group to be spousal caregivers and live alone with the care recipient. Many of the care recipients were men (n = 47, 64%), with an age range of 57 to 97 years old (average age 75.2 years, ± 8.8). While most of the care recipients had a diagnosis of MCI (n = 43, 58.9%), half of them were employed (n = 27, 50.6%).³⁵

3.2. Caregiver Burden Levels:

At study start-up, participants endorsed moderate levels of objective and subjective caregiver burden. Specifically, the sample endorsed new responsibility for an average of three household and personal management tasks (such as medication administration) and a moderate amount lifestyle constraint (Table A1). With regards to subjective caregiver burden, care recipients' exhibited an average of five behaviors that occurred weekly or more often that were “moderately to severely bothersome or upsetting” to the caregiver. Further,

the sample endorsed a moderate amount of perceived caregiving burden at baseline (Table A1).

3.2.1. Intervention Effects on Objective Caregiving Burden—The PST intervention did not significantly influence either outcome measure of objective burden, yet the type of caregiver (MCI vs early-stage dementia) and time (over one year of follow-up) had a significant impact on these burden ratings (see Table B1). Specifically, there was a main effect for type of caregiver such that early-stage dementia caregivers endorsed higher levels of both task-related responsibilities and lifestyle constraints, on average, than MCI caregivers (Table B1, Figure C1, and C2). There was also a main effect for time and an interaction effect for type of caregiver over time with regards to lifestyle constraints (Table B1, Figure C2). This suggests that the severity of lifestyle constraints varied over time, depending on the severity of cognitive impairment in the care recipient (i.e., MCI or early-stage dementia). While early-stage dementia caregivers appeared to show a decrease in lifestyle constraints after the PST intervention (for six months), they endorsed a renewed level of constraints by the end of the follow-up period (by one year post-intervention). In contrast, lifestyle constraints levels were more stable in the MCI caregivers over time.

3.2.2. Intervention Effects on Subjective Caregiving Burden—Results of the mixed effects analysis support the hypothesis that PST positively impacted caregiver distress related to care recipient dementia-related behaviors. For this outcome, we found a significant main effect for time and an interaction effect between treatment group and time (indicating that PST versus NT-groups' dementia-related behavioral burden levels changed at different rates over time), and the analysis also showed a significant interaction between treatment group, type of caregiver, and time (Table B1 and Figure C3). This three-way interaction indicates that there were treatment group differences over time and these differences varied depending on the type of caregiver. Namely, dementia-related behavioral burden levels of MCI caregivers in the PST-group remained relatively low and stable over time, while burden levels among MCI caregivers in the NT-group started low but increased steadily during the 1-year follow-up period. In contrast, early-stage dementia caregivers in the PST-group began with high burden levels which declined over time while burden levels in the early-stage dementia caregivers in the NT-group began with burden levels similar to MCI caregivers but showed the largest increase over time (Figure C3).

Perceived caregiving burden (e.g., worry, exhaustion) levels showed significant main effects for the type of caregiver (MCI or early-stage dementia) and time, and a significant treatment group by time interaction (Table B1). With regard to the main effect for type of caregiver, examination of the data in Figure C4 shows that early-stage dementia caregivers endorse higher levels of perceived burden, on average, than MCI caregivers. The interaction effect indicates that the rates of change varied in the early-stage dementia group over one-year of follow-up. Thus, at baseline, both types of caregivers (MCI and early-stage dementia) in the PST group endorsed higher perceived burden levels than caregivers in the NT group. By 1-year after the intervention, perceived burden levels of both types of caregivers were similar, regardless of treatment group. It is noteworthy that the early stage dementia caregivers in the PST group endorsed high levels of perceived burden that declined for 6 months after the

intervention, while those burden levels did not show a consistent decline among early-stage dementia caregivers in the NT group. The MCI caregivers showed less striking levels of change over time.

4. Discussion

To the best of our knowledge, this is the first study to test the effects of a PST-based intervention on burden levels of caregivers of family members with MCI or early-stage dementia. Results of this study suggest that the PST intervention positively impacts subjective (but not objective or task-related) caregiving burden over time. Specifically, the PST intervention positively impacts negative reactions to bothersome dementia-related behaviors, particularly among the early-stage dementia caregivers. When compared to NT, PST appeared to have a protective effect on dementia-related behavioral burden levels in MCI family caregivers, i.e., it prevented them from developing burden and kept their reported burden levels low. In contrast, PST appeared to have a positive treatment effect on early-stage dementia family caregiver's dementia-related behavioral burden levels (i.e., it lowered their initially high levels of distress over frequently occurring of dementia-related behavioral burden). This is important because bothersome dementia-related behaviors, rather than physical dependence or functional impairment in the care recipient, have been found to impose the greatest burden on family caregivers^{4,8,10,12,44} and to predict caregiver decisions to institutionalize family members with dementia.^{45,46}

Compared to caregivers in the NT group, caregivers in the PST group also endorsed improved (lower) perceived burden (worry, exhaustion) levels up to six months after the intervention, regardless of the type of caregiver (MCI or early-stage dementia). By one-year of follow-up, perceived burden levels of MCI caregivers were almost as high as early-stage dementia caregivers in both treatment groups. In contrast, perceived burden levels in early-stage dementia caregivers in the PST group improved for six-months after the intervention; however, those positive treatment effects were lost by one-year of follow-up. Early-stage dementia caregivers in the NT group endorsed varying levels of perceived caregiver burden over the year of follow-up. These data suggest that PST-booster sessions, delivered every three to six months, may benefit early-stage dementia caregivers' perceived burden levels.

In relation to objective measures of caregiver burden, early-stage dementia caregivers endorsed more new task-related responsibilities than MCI caregivers and PST had no effect on these new task-related responsibilities over time. The severity of lifestyle constraints varied over time, depending on the severity of cognitive impairment in the care recipient (i.e., MCI or early-stage dementia). PST may have positively impacted lifestyle constraints among early-stage dementia caregivers in the short-term, but those benefits were not statistically significant. These data suggest that PST-booster sessions, delivered to early-stage dementia caregivers at three-month intervals, may lead to sustained improvements in burden associated with lifestyle constraints.

In the context of family caregiving, results of this study extend the literature by suggesting that PST-based interventions reduce subjective burden levels when delivered "early" (soon after a diagnosis of cognitive impairment) in the caregiving trajectory. In a study with

caregivers of persons with dementia, where the care recipients were diagnosed with dementia an average of 26 months before study enrollment, PST had no effect on subjective burden levels.⁴⁷ Also, a problem-solving skill building class had no impact on subjective caregiver burden levels in another study in which the care recipients had been diagnosed with dementia an average of 56 months (4.5 years) earlier.²² Further, 16% and 20% of the caregivers did not live with the care recipient in the Robert et al.⁴⁷ and Gallagher-Thompson et al. studies,²² respectively. In the current study, care recipients received an ADRC research diagnosis of MCI or early-stage dementia within six months of study enrollment and all of the caregivers lived with the care recipient. A decision was made to enroll only family caregivers that lived with the care recipients since we felt these caregivers would be at greater risk for experiencing burden associated with the early caregiving role.

4.2. Study limitations

There are several limitations of the current study. It is unclear whether our findings would generalize beyond family caregivers of individuals who sought a diagnosis for their cognitive complaints at an ADRC. These caregivers may differ from caregivers of family members who receive a cognitive diagnosis from their primary care or other healthcare provider. Further, with a 54% enrollment and 26% attrition rate in the current study, it is possible that caregivers that enrolled in the study were particularly challenged by their new caregiving role. Yet, the literature suggests that recruitment and retention rates of this study are consistent with rates obtained in other PST intervention studies with dementia family caregivers.^{17–22}

Other factors also may limit the generalizability of our study findings. First, the sample is relatively small and racially homogeneous. Second, we focused on caregivers who resided with the care recipient since these individuals may be at greater risk for experiencing burden early in the caregiving trajectory (versus non-cohabitating caregivers). Third, we did not collect information about the duration of caregiving. We made a decision to enroll participants at the point of ADRC diagnosis since the subtle onset and progression of symptoms in persons with neurocognitive disorders often necessitates that family members assume the role of caregiver without identifying themselves as a “caregiver” until the middle stages of the disease.²⁴ This is particularly true for spousal caregivers because the caregiving role grows naturally out of prior patterns of support and assistance that are exchanged between married couples.¹³ Further, the results may be biased since the study was too small to blind the outcomes evaluators to the participants’ treatment group assignment.

Another limitation of the current study is the sample size. Having 73 study participants limits our ability to conduct moderation and mediation analyses on treatment effects. One would need a larger sample, with the random assignment of participants to various levels of the mediating variable, to test the relationship between the mediating and dependent variable. For example, it is possible that differences in baseline characteristics (caregivers in the PST were more likely than those in the NT group to be a spousal versus adult child caregivers and to live alone with the care recipient) moderate treatment outcomes. It is also possible that changes in depression levels mediate changes in caregiving burden outcomes over time.

The study was further limited by the fact that we did not have information about the duration of caregiving. We made a decision to enroll participants at the point of ADRC diagnosis since the subtle onset and progression of symptoms in persons with neurocognitive disorders often necessitates that family members assume the role of caregiver without identifying themselves as a “caregiver” until the middle stages of the disease.²⁴ This is particularly true for spousal caregivers because the caregiving role grows naturally out of prior patterns of support and assistance that are exchanged between married couples.¹³ Also, we did not measure adherence to “principles of PST” since PST was conceptualized as a coping resource. It is possible that PST was not “utilized” by caregivers in the study. Lastly, the results may be biased since the study was too small to blind the outcomes evaluators to the participants’ treatment group assignment.

5. Conclusion

Our findings suggest that, among caregivers relatively early in the dementia caregiving trajectory, PST is effective at reducing perceived burden and distress associated with bothersome dementia-related behaviors in the care recipient. These data contribute substantially to the dementia caregiver intervention literature since PST specifically targets burden levels associated with dementia-related behaviors in the care recipient and this type of burden has the greatest impact on caregiver mental health.^{3,4,10,12,15,26,44,45,46} Because of the significant role of family in providing care for people with dementia, as well as reducing the need for institutional care facilities, finding effective methods for coping with bothersome dementia-related behaviors is both a public health and an economic priority.¹

Our results are promising because they suggest that interventions designed to promote adaptive problem-solving skills slow the development or worsening of subjective caregiving burden, when taught relatively early in the caregiving trajectory. Since high levels of burden are a serious consequence of dementia family caregiving,^{2–15} and the prevalence of dementia is projected to rise in the near future,¹ such treatments show promise for the mental health of the Nation’s informal caregivers, as family members provide long-term, home-based care to loved-ones with dementia. More research is required to substantiate these findings in a larger and more racially diverse sample. It will also be important to learn if PST-booster sessions improve lifestyle constraints and/or perceived caregiver burden levels beyond 6-months and how frequently PST-booster sessions must be delivered to maintain the positive effects on burden scores along the caregiving trajectory.

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Figure C1:

Average Task-Related Responsibilities by Type of Caregiver, over Time (PST n = 36, NT n = 37)

Figure C2:

Average Levels of Lifestyle Constraints by Type of Caregiver, over Time (PST n = 36, NT n = 37)

Figure C3:

Average Number of Dementia-Related Behaviors Causing Caregiver Distress by Type of Caregiver, over Time (PST n = 36, NT n = 37)

Figure C4:
Average Levels of Perceived Caregiver Burden by Type of Caregiver, over Time (PST n = 36, NT n = 37)

Table A1:Baseline burden levels of the study sample, n (%) or M ($\pm$ SD)

	<i>Total Sample (N = 73)</i>	<i>[†]PST Group (n = 36)</i>	<i>[‡]NT Group (n = 37)</i>	<i>*Statistical test</i>	<i>P</i>
Burden Levels					
New task-related responsibilities (range 0–11)	2.5 (2.6)	3.0 (3.2)	3.3 (2.8)	–.376	.708
Lifestyle constraints (range = 8–40)	19.1 (6.2)	19.1(6.2)	19.1 (6.2)	.004	.997
Number of distressing dementia-related behaviors that occur weekly or more often (range = 0 – 24)	5.0 (5.1)	5.9 (5.8)	4.1 (4.1)	1.52	.132
Perceived caregiver burden (range = 13–65)	32.5 (8.9)	33.7 (8.6)	31.4 (9.1)	1.12	.265

* $p < 0.05$ (two-tailed), Independent sample t-test statistics (df=71) were computed for continuous data and χ^2 tests (df=1) were computed for dichotomous data;

[†] Problem Solving Training,

[‡] Nutritional Training

Table B1:

Intervention Effects (treatment group, type of caregiver, and time) on Caregiver Burden (N=73)

	Objective Caregiver Burden				Subjective Caregiver Burden			
	New Task-Related Responsibilities		Lifestyle Constraints		Bothersome and frequent dementia-related behaviors		Perceived Burden	
	F	p	F	p	F	p	F	p
Treatment group ([†] PST vs [‡] NT)	.34	.563	.39	.534	.88	.351	.003	.955
Type of caregiver ([§] MCI vs [¶] AD)	13.12 **	.001	7.26 **	.009	3.19	.079	5.597 *	.021
Time (1 year of follow-up)	1.15	.346	3.57 *	.012	9.05 **	.000	2.649 *	.044
Treatment group by type of caregiver	.23	.635	1.03	.315	2.99	.088	.734	.395
Treatment group by time	.18	.948	2.03	.105	4.72 **	.003	2.793 *	.036
Type of caregiver by time	.58	.681	2.59 *	.048	.780	.544	1.964	.114
Treatment group by time by type of caregiver	.43	.787	.821	.518	2.72 *	.040	.497	.738

*
p < .05,**
p < .01,[†]Problem Solving Training,[‡]Nutritional Training,[§]Mild cognitive impairment,[¶]Early-stage dementia