A Problem-Solving Early Intervention for Stroke Caregivers: One Year Follow-Up

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Purpose: The study purposes were to assess the efficacy of a caregiver problem-solving intervention (CPSI) on stroke caregiver physical and psychosocial adaptation compared with a wait-list control (WLC) treatment, and to assess the mediation effects of coping on outcomes.

Methods: A stress and coping model guided the study design. Outcomes were depression, anxiety, preparedness, life changes, and family functioning. CPSI started during acute rehabilitation and continued 3 months postdischarge. Data were collected at baseline (T1), postintervention (T2), and 6 (T3) and 12 months postdischarge (T4).

Results: Of 255 caregivers, 75% were depressed at baseline. Repeated measures ANOVA of study completers ($n = 121$) indicated improved T2 depression, life change, and health ($ps < .04$) favoring the CPSI group. Improvements faded by 6 months. Although no group differences in outcomes were found in the intention-to-treat analysis, growth curve modeling indicated a difference in depression rate of change, favoring the CPSI ($p = .04$). Perceived health, threat appraisal and rational problem-solving were significant mediators ($ps < .05$).

Conclusions: Findings provide direction for future interventions to promote and sustain healthy caregiver adaptation.

KEY WORDS

caregiver
depression
mediators
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Introduction

Approximately 800,000 new or recurrent strokes occur each year in the United States (Lloyd-Jones et al., 2010); about 550,000 survive. Most survivors return home with a family member, who suddenly assumes the caregiver role with great uncertainty (King, Shade-Zeldow, Carlson, Knafl, & Roth, 1995). Many caregivers feel unprepared for and overwhelmed by their caregiver role and the life changes that occur (Bakas, Austin, Okonkwo, Lewis, & Chadwick, 2002; Cameron & Gignac, 2008; Ilse, Feys, Wit, Putman, & Weerd, 2008). Negative perceptions, stress, and depression are common and have potential to affect family interactions and the well-being and functioning of the stroke survivor and caregiver (Barskova & Wilz, 2007; Berg, Palomaki, Lonnqvist, Lehtihalmes, & Kaste, 2005; Hartke, King, Heinemann, & Semik, 2006; King, Shade-Zeldow, Carlson, Feldman, & Philip, 2002; King et al., 2001; Pinquart & Sörensen, 2007). Caregiver physical health issues, needs, and problems are common and contribute to negative outcomes (Bakas et al., 2002; Hartke & King, 2002; King & Semik, 2006; King et al., 2001; Murray, Young, Forster, Herbert, & Ashworth, 2006). Few studies have demonstrated efficacy in promoting psychosocial adaptation during transition to the caregiver role. Fewer still have demonstrated durable treatment effects. Consequently, the prevalence

of depression in stroke caregivers remains high (30%–55%) (Berg et al., 2005; King, Hartke, & Denby, 2007; King et al., 2001; Visser-Meily, Post, de Port, Heugten, & Bos, 2008).

Depression and other negative outcomes have been associated with maladaptive coping, such as negative problem-solving and appraisals, and passive coping tendencies (Bakas & Burgener, 2002; Grant et al., 2006; King et al., 2001; Visser-Meily et al., 2008). Anxiety also is common (Dennis, O'Rourke, Lewis, Sharpe, & Warlow, 1998; Smith et al., 2004), but has received little attention. Contributing to distress are problems, such as the survivor's care, balancing care-related tasks and commitments, and managing their own emotions (Bakas et al., 2002; Grant, Glandon, Elliott, Giger, & Weaver, 2004; Haley et al., 2009; Hartke & King, 2002). Stress has contributed to physical health changes and injury (Hartke et al., 2006; Hayes, Chapman, Young, & Rittman, 2009), as well as increased risk for stroke among men, particularly African American men (Haley, Roth, Howard, & Safford, 2010). Little is known about the trajectory of stroke caregiver health over time (Han & Haley, 1999).

Reviewers of caregiver research concluded that the evidence did not support recommending a specific intervention for clinical practice (Boschen, Gargaro, Gan, Gerber, & Brandys, 2007; Eldred &

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Sykes, 2008; Visser-Meily, Heugten, Post, Schepers, & Lindeman, 2005). However, problem-solving or supportive treatments tend to result in more positive psychosocial outcomes (Dennis, O'Rourke, Slattery, Staniforth, & Warlow, 1997; Evans, Matlock, Bishop, Stranahan, & Pederson, 1988; Grant, Elliott, Weaver, Bartolucci, & Giger, 2002). Multi-component counseling or counseling-education treatments that emphasize caregiver problems and needs may be most effective (Visser-Meily et al., 2005). Supporting this recommendation, a review of information-provision interventions reported no effect on mood (Smith, Forster, & Young, 2009). Research evidence supports the need for early interventions that coach stress management and are accessible to prevent chronic distress. Coping variables have been identified as a potential intervention target, as they have mediated relationships between background factors and distress (Haley et al., 1996; Morano & King, 2005).

Building on prior research, we tested a caregiver problem-solving intervention (CPSI) to reduce and prevent negative outcomes in the first year of caregiving, and to examine the role of coping in mediating caregiver outcomes. We hypothesized that: (1) the CPSI intervention would result in greater improvement in depressive symptoms, anxiety, caregiver preparedness, life change, and family functioning than a wait-list control (WLC) group during the first year caregiving and (2) caregiving appraisal and problem-solving would mediate outcomes. The exploratory question was Do the groups differ on perceived health over time?

Conceptual model

A Stress and Coping Model (Moos & Schaefer, 1993) guided selection of the intervention and variables. The model proposes that personal factors influence responses to life crises and transitions. These combined factors influence adaptation directly and indirectly through mediators, such as cognitive appraisal and coping strategies (the coping process). The problem-solving intervention is intended to intervene at the mediator level to promote positive problem-solving, reduce threat appraisal, and manage stress.

Methods

Study design

A randomized control two-group design was employed to test the efficacy of the problem-solving intervention. Outcomes were five caregiver adaptation variables. Mediators were three caregiving appraisal scales and five problem-solving scales.

The study was approved by the institutional review boards at two free-standing rehabilitation hospitals and rehabilitation units in two hospitals. Participant selection criteria were: (1) planned discharge of survivor to home, (2) primary caregiver living with the survivor, (3) caregiver not involved in a support group or therapy, (4) access to a telephone and sufficient hearing to use a phone, (5) survivor and caregiver age 21 or older, and (6) caregiver depression screening score over 9 on the Center for Epidemiologic Studies-Depression (CES-D) scale (Radloff, 1977). This score has shown increased risk for depression 1 year later (King, Shade-Zeldow, Carlson, & Roth, 1998). A primary caregiver was defined as one who supervised, assisted, or managed care.

Recruiters contacted family members during acute rehabilitation to verify their role as primary caregiver, to explain the protocol, and obtain informed consent. Stroke survivor consent was obtained after the caregiver was enrolled. Consent of survivors was not necessary for caregiver participation. After baseline data collection, computerized random assignment by site and stratified by dyadic relationship was done. Relationship stratification was done because of greater nonspousal attrition in an earlier study (King et al., 2001). Research assistants, who were blinded to treatment assignment, collected data at baseline (preintervention, T1); 3 to 4 months postdischarge/postintervention (T2), and 6 (T3), and 12 months postdischarge (T4).

Interventions

Caregiver problem-solving protocol. Emotional responses to problems and concerns were the treatment focus. Social problem-solving therapy combines cognitive and coping strategies to manage stress by altering problem orientation and improving problem-solving (D'Zurilla, 1986). Problem orientation training alters cognitions about problem normalcy and the potential for successful problem-solving. A cognitive behavioral treatment paradigm was incorporated, based on the theory that cognitions, moods, and behaviors are linked and provide opportunities for change (Beck et al., 1979).

The CPSI consisted of a manualized 10-session intervention. Content included stress management, problem-solving, emotional-social impact of caregiving, depressive symptoms and prevention, self-care, family roles, and resources. Handouts were provided to tailor information to specific problems. The intervention included training in skills for problem-solving and coping with stress and emotional responses (stress management, relaxation training, reframing negative thoughts, mood

rating). When possible, the first two sessions occurred during the survivor's hospitalization to promote rapport. Sessions 3 through 7 were conducted by telephone weekly, then biweekly (8 to 10). Participants identified caregiving related problems and developed plans to solve them using the problem-solving steps. They were asked to complete home assignments, such as applying problem-solving to problems and practicing relaxation. Two nurse practitioners and two advanced clinical psychology doctoral students delivered the CPSI.

Wait-list Control Protocol. A counselor, naïve to the CPSI, contacted the WLC caregivers following baseline assessment and did a well-being check in the second and fifth months. WLC participants could independently access other resources during the study. Such activities were monitored during routine data collection. Following the 6-month assessment, participation in an optional treatment component was offered. The treatment was five 30-min telephone sessions, consisting of supportive listening with no problem-solving or information-giving. Three advanced clinical psychology students delivered the WLC treatments.

Procedures applying to the CPSI and WLC groups. All participants received usual care, such as discharge planning and follow-up care and were given a stress management booklet and the opportunity to subscribe to the American Heart/Stroke Association Connection magazine. All caregivers who scored ≥ 30 on the CES-D at any time were alerted to their high score and given counseling referrals. Counselor supervision included the use of session audio-tapes, posttreatment records, and integrity checklists to rate adherence to protocol and study integrity. CPSI counselor training included didactic and experiential methods (role play) and was augmented by readings and videos. All counselors were trained in cultural considerations and used a counselor manual to guide the intervention. WLC counselors were trained separately.

Variables and Measures

Caregiver measures. Caregiver personal and illness factors were collected including, demographics, perceived health, prior treatment for emotional problems, psychotropic medication, and injury. Measures were read to caregivers by research assistants; assessments took 45–60 min. Internal consistency reliabilities were adequate for all measures at four times (.71 to .95).

Adaptation Outcome Measures. Depression was assessed using the Center for Epidemiologic Studies–Depression scale (CES–D)(Radloff, 1977; Shinar et al., 1986). The 20-item CES-D measures depressive

symptom severity during the past week. The possible range of scores is 0–60 with higher scores reflecting greater symptom severity, 16 is indicative of depression. Baseline scores were used to identify eligibility for enrollment. High correlations with other measures of depression were reported (Shinar et al., 1986).

Perception of Life Change was measured using the Bakas Caregiving Outcomes scale (BCOS) which consists of 15 items with a 7-point response set. It measures negative and positive changes in social functioning, subjective well-being, and somatic health, (Bakas & Champion, 1999). Content and construct validity are strong (Bakas & Champion, 1999; Bakas, Champion, Perkins, Farran, & Williams, 2006). Scores can range from 15 to 105, with higher scores reflecting more positive life change.

Caregiver Preparedness was assessed using the Preparedness for Caregiving Scale (Archbold, Stewart, Greenlick, & Harvath, 1990), which is an 8-item, 5-response option scale. The scale assesses perception of preparedness to manage caregiving tasks and stresses. The potential range of total scores is 0–4. Higher scores reflect greater preparedness. This scale reflects common caregiver concerns and is reliable and valid (Archbold et al., 1990).

Anxiety was measured using the Tension-Anxiety 5-item subscale of the Profile of Moods Scale short form (McNair, Lorr, & Droppleman, 1992). Feelings ranging from intense to mild are measured; higher scores reflect greater anxiety. Predictive, construct, and concurrent validity have been reported (McNair et al.). The possible range of scores is 0–20. Higher scores reflect greater anxiety.

Family functioning was assessed using the General Functioning Scale of the McMaster Family Assessment Device (FAD; (Epstein, Baldwin, & Bishop, 1983). This 12 item, 4-point scale assesses family health/pathology. Scores range from 1 to 4; higher scores indicate less healthy functioning with scores over 2.0 indicating ineffective functioning. Concurrent and predictive validity have been reported (Epstein et al.).

Moderator and mediator variables. Caregiver perceived health was measured by a single item rated (0 = “poor” to 3 = “excellent”) that has demonstrated validity (Idler & Benyamini, 1997). Resources and stressors were assessed using the investigator-generated Intervening Events Questionnaire (IEQ). Caregivers were asked to check the resources and services used and stressors experienced since the prior assessment on listings of 15 resources and 9 stressors and to add items not listed. The items selected were summed for a total score.

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The Appraisal of Caregiving Scale (ACS-Revised) assesses benefit, benign, and threat appraisals (Carey, Oberst, McCubbin, & Hughes, 1991; Oberst, 1991). The ACS is comprised of 27 items rated on a 5-point scale. Mean scale scores reflect higher levels of the scale construct. The possible range of scores is 1–5. Validity was supported by significant correlations in the expected directions between the appraisal scales and caregiving antecedents and outcomes (Oberst, 1991).

The Social Problem Solving SPSI-R short form was used to assess problem-solving coping (D’Zurilla, Nezu, & Maydeu-Olivares, 1996; D’Zurilla & Sheedy, 1991). The 25-item scale measures problem-orientation (positive (PPO), negative (NPO), and problem-solving styles (impulsive/careless, avoidance, and rational). The responses range from (0 = not true to 4 = extremely true). Possible scale scores range from 0 to 20. Whereas higher scores are desired for the positive scales (PPO, rational), lower scores are desired for the negative scales (NPO, impulsive-careless, and avoidance). Validity has been supported by correlations with depression and anxiety in the expected directions (D’Zurilla et al.).

Survivor Variables. Data were collected on demographics, stroke type, impairment, comorbidity, and mortality, functional status. Function was measured using the Functional Independence Measure (FIM™), which assessed disability severity using an 18-item, 7-point scale; higher scores represent greater independence (Granger, Hamilton, Keith, Zielezny, & Sherwin, 1986). The possible range of scores is 18–126. The FIM is reliable and valid. Survivor functional data were retrieved from the stroke survivors’ medical records at baseline and from caregivers postdischarge

Attrition/Retention

If a change in residence occurred, it was documented, and the caregiver continued data collection if they remained involved with the survivor’s care. Caregivers who did not complete the intervention were contacted for follow-up assessments and were included in the intention-to-treat analysis. Efforts to prevent attrition included sending holiday, birthday, thank you, and inspirational cards. A stipend of \$20 was provided after completion of each assessment.

Statistical analysis

The sample size of 260 participants was selected to ensure 80% power for detecting a difference between the groups with an effect size of 1.0, allowing for 30% attrition. Type I error was set at

5%. The effect size of 1.0 was a conservative estimate based on the between group depression effect ($d = 1.37$) found in the pilot study (King et al., 2007). We oversampled because 23% and 6%, respectively, of consenting caregivers were not eligible or did not complete baseline measures.

Variable distributions were examined for suitability in multivariate analysis, and the existence of outliers was evaluated. Mean (SD) and frequency (%) were used to describe characteristics and measures. T-tests or Chi-square analyses were computed to compare dropouts and completers. Two analyzable data sets were computed: Intention-to-treat (using all available data) and per protocol analyses (completers with all follow-ups). Growth curve modeling (GCM) analysis was used because it allows the inclusion of all cases with data at any time and provides a trajectory over time while explaining prediction of outcomes and mediator effects. Growth curve models were estimated within a multilevel framework (Raudenbush & Bryk, 2002; Singer & Willett, 2003) to examine rates of change in outcomes over time. These models include two parts: the trajectories of outcomes within individuals over four time points (Level 1) and variation of trajectories across the entire sample (Level 2). The intercept at Level 1 is the individual’s baseline status; the slope indicates the rate of change. The random intercept and slope models were specified for estimation of these individual trajectories. The GCM findings also can identify timing of decay in outcome effects to provide data in predicting outcomes and for future planning. The following GC models were computed for all outcomes adjusting for demographics, (survivor gender and function, caregiver race, education, gender, age, and relation to survivor), caregiver health, and mediators (three appraisals, five PS scales, resource use and stress).

A repeated measures analysis of variance was computed to assess group differences in changes in outcomes and health for caregivers with complete data. These analyses were performed because group differences in attrition may have contributed to spurious results in the GCM analysis. Statistical significance was set at $p < 0.05$ for all analyses. No attempts were made to adjust for multiple comparisons, but exact p values are reported. All analyses were done in SAS, Version 9.2. Adjustment of p values when outcomes are correlated, as in this study, is likely to be overly conservative and lead to an increase in type II error resulting in a loss of power to detect true effects. Hence, we did not adjust for multiple outcomes (Bender & Lange, 2001; Feise, 2002).

Results

Sample description, recruitment, and retention

Of 362 caregivers who consented, 23% did not meet the screening criteria, 6% did not complete baseline assessment, and 22% of 255 with baseline data did not have follow-up data (Figure 1). Reasons for attrition included death of stroke survivors and one caregiver, too busy, or unable to reach the caregiver. Baseline variables were similar for the groups (Table 1). Attrition differed on the following variables ($p < .05$): treatment group (29% CPSI, 14% WLC), income (46% $< \$20,000$, 19% $\geq \$20,000$), race (23% White, 41% Non-White), and relationship (18% spouse, 29% nonspouse). Fifty percent of low income Black caregivers dropped out compared with 36% non-Black ($p = .09$). Most caregivers were female (78%), and in a spousal relationship with the survivor (63%) (Table 1). Prior treatment for an emotional problem (11%) and current psychotropic medication use (9%) were reported at baseline.

Nineteen caregivers (14%) did not start the sessions. Ninety-four of 136 caregivers (69%) met the criteria of five or more sessions for completion; 86 (63%) completed 10 ($M = 8.2$, $SD = 3.2$). The first five sessions were considered completed treatment because

they included content essential for stress management and problem-solving, such as relaxation training and the problem-solving steps. Average minutes for sessions were 37 ($SD = 13.8$) and 18 ($SD = 8.2$), respectively, for CPSI and WLC. Caregiver evaluations of counselor contacts were rated 1 = strongly disagree to 5 = strongly agree. Those completing five or more sessions and completing an evaluation ($n = 64$) showed mean ratings reflecting strong agreement with seven items, such as "helped solve problem" and "felt emotionally relieved" ($M = 4.61$, $SD = .58$). WLC participants' scores ($n = 20$) reflected agreement with helpfulness of items ($M = 4.29$, $SD = .82$). Scores for eight dropout caregivers indicated, on average, that they felt neutral about the study's helpfulness ($M = 3.14$, $SD = 1.10$).

Caregivers identified a large range of problems that were characterized by three typologies: sustaining the self and family (balancing responsibilities/tasks, own emotions, etc.), interpersonal disruptions (family conflicts, survivor relationship issues), and stroke survivor functioning (care demands, survivor emotions, etc.). Sustaining the self and family problems were most frequent, but interpersonal disruptions were most stressful and lowest in coping effectiveness (King, Rourke Ainsworth, Ronen, & Hartke, 2010b). Strategies varied with the problem, e.g., time management, seeking help, obtaining referrals, strategies to improve survivor adherence.

Figure 1. Consort Figure illustrating the flow of study subjects in the Caregiver Problem-Solving Interventions (CPSI) and the Wait-list Control (WLC) group

Intervention Effects Using All Available Data

Of 255 caregivers in the intention-to-treat analysis; 40 CPSI caregivers and 17 WLC had no follow-up data. A high rate of depression (75%) and depressive symptoms were found at baseline (Table 2). Moderate to severe depression ($CES-D \geq 30$) was found in 28% at baseline and 10% at T4. A total of 89 caregivers were referred for counseling for scores ≥ 30 . No significant difference was found in referrals by group ($\chi^2 df = 1$, $N = 89$)=.017, $p = .78$).

The hypothesis, that the CPSI group would experience significantly greater improvement in outcomes compared with the WLC, was not supported in the GCM, adjusted for covariates and mediators. Table 3 shows variables over time with the estimate of effect and p values. The unadjusted trajectory of change illustrated in Figure 2 shows that group differences in depression begin to merge after 6 months ($p = .04$). The CPSI group's growth curve declines faster and inclines faster than WLC after 6 months (Figure 2). No significant differences were found between groups over time.

Table 2 shows descriptive statistics for outcomes, and the significant moderators and media-

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Table 1. Caregiver and Patient Demographics

CPSI <i>n</i> = 136				WLC <i>n</i> = 119		
Caregiver	Range	Mean (SD)	<i>N</i> (%)	Range	Mean (SD)	<i>N</i> (%)
Gender (female)			104 (76.5)			96 (80.7)
Race (white)			90 (66.2)			72 (60.5)
Relation (spouse)			84 (61.8)			76 (63.9)
Age	24–85	54.5 (15.1)		21–82	54.6 (13.3)	
Education $\geq$ HS			123 (90.4%)			110 (92.4%)
Comorbid conditions	0–6	1.2 (1.2)		0–4	0.9 (1.1)	
Hours caregiving	1–24	8.5 (5.3)		2–24	8.3 (5.6)	
Employment (Full/part-time)			67 (57%)			66 (55.4%)
Patient		<i>n</i> = 136			<i>n</i> = 112	
Gender (female)			58 (42.6)			46 (38.7)
Race (white)			97 (71.3)			81 (68.1)
First Stroke (yes)			103 (75.7)			95 (79.8)
Age	22–93	61.2 (14.6)	128	27–92	61.5 (14.7)	
FIM	18–96	48.1 (20.5)	129	18–95	47.3 (19.4)	
Education $\geq$ HS			108 (84.6%)			98 (81.8%)

Note. Variables are not significant between groups. CPSI Patient *N* = 129 for education.

Table 2. Means and Standard Deviations (SD) for Outcomes, and Significant Mediators and Moderators at Four Times

Measure	Baseline		Time 2		Time 3		Time 4	
	<i>n</i> = 136	<i>n</i> = 119	<i>n</i> = 81	<i>n</i> = 92	<i>n</i> = 78	<i>n</i> = 87	<i>n</i> = 70	<i>n</i> = 75
	CPSI	Control	CPSI	Control	CPSI	Control	CPSI	Control
CES-D	23.40 (9.43)	22.64 (9.68)	14.17 (9.75)	15.33 (9.41)	14.81 (10.39)	15.30 (10.85)	16.37 (11.17)	15.01 (10.26)
Anxiety	7.20 (4.73)	7.37 (4.28)	4.64 (3.66)	5.30 (3.99)	4.55 (3.68)	4.79 (3.96)	4.94 (4.00)	4.85 (3.92)
Prepare	2.46 (0.77)	2.49 (0.69)	2.87 (0.62)	2.81 (0.62)	2.89 (0.62)	2.86 (0.71)	2.94 (0.69)	2.98 (0.614)
Bakas	53.78 (10.83)	55.33 (11.42)	57.92 (11.54)	57.04 (13.05)	56.09 (12.42)	55.89 (11.08)	58.00 (11.77)	56.12 (12.29)
FAD	1.94 (0.43)	1.97 (0.46)	1.91 (0.48)	1.98 (0.43)	1.99 (0.52)	1.97 (0.46)	1.99 (0.51)	1.92 (0.50)
FIM	48.06 (19.88)	47.30 (19.04)	99.56 (23.71)	95.45 (25.11)	98.54 (24.82)	94.76 (26.46)	103.17 (23.15)	95.32 (29.03)
Threat	2.84 (0.68)	2.82 (0.70)	2.69 (0.67)	2.75 (0.67)	2.80 (0.70)	2.82 (0.70)	2.86 (0.70)	2.85 (0.74)
Benefit	3.58 (0.66)	3.61 (0.57)	3.76 (0.59) ^a	3.56 (0.69)	3.63 (0.68)	3.60 (0.62)	3.69 (.64)	3.67 (0.58)
Health	1.82 (0.70)	1.88 (0.67)	1.90 (0.66) ^b	1.70 (0.62)	1.85 (0.60)	1.75 (0.69)	1.74 (0.66)	1.71 (0.65)
IEQ Resource	4.25 (2.48)	4.22 (2.46)	5.67 (2.50)	4.82 (2.36)	5.10 (2.37)	4.99 (2.38)	5.00 (2.43)	4.82 (2.59)
IEQ Stress	1.64 (1.27)	1.51 (1.11)	2.40 (1.48)	2.31 (1.56)	2.32 (1.42)	2.05 (1.44)	2.38 (1.46)	2.08 (1.32)

Notes. No significant group differences were found at baseline.

T2 = 3–4 months, T3 = 6 months, T4 = 12 months.

For T2, 3, 4 change, higher positive change is desired for Prepare, Bakas, FIM, Benefit, and Health. Greater negative change is desired for CES-D, Anxiety, FAD, Threat, and Stress.

Variable Names: CES-D = Center for Epidemiologic Studies-Depression Anxiety, Prepare = Caregiving Preparedness scale, Bakas = Bakas Caregiving Outcomes Scale, FAD = McMaster Family Assessment Device, FIM™ Threat = threat appraisal, Benefit = benefit appraisal, IEQ = Intervening Events Questionnaire Stress and Resources.

^a*t* = 2.68, *p* = .008; ^b*t* = 3.29, *p* = .001: univariate *t*-tests; Benefit and Health change = significant between groups. FIM, Health, IEQ Resources/Stress, and Threat = significant moderators or mediators in growth curve model.

Table 3. Quadratic Growth Curve Model on Study Outcomes at Time 1, 2, 3, and 4^a

Fixed effect	Study group	CES-D			Anxiety			Prepare			Bakas			FAD		
		Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
Intercept		9.89	3.77	.01	2.08	1.83	.26	3.22	0.30	<.0001	71.59	4.82	<.0001	2.27	0.18	<.0001
Time		-1.31	0.45	.004	-0.32	0.22	.15	0.01	0.04	.74	-0.47	0.65	.47	0.02	0.02	.26
Time × Time		0.09	0.03	.0004	0.03	0.01	.001	0.00	0.002	.02	0.02	0.03	.56	-0.002	0.001	.17
Group	CPSI vs. WLC	0.16	1.11	.88	-0.14	0.46	.77	0.00	0.07	.96	-1.08	1.09	.32	-0.03	0.06	.55
Group × Time		-0.41	0.44	.36	-0.06	0.16	.71	0.006	0.03	.82	0.33	0.45	.45	0.01	0.02	.54
Group × Time × Time		0.04	0.03	.19	0.01	0.01	.41	-0.0006	0.002	.75	-0.02	0.04	.67	0.000	0.001	.91
Race	Non-white vs. White	0.36	1.04	.73	-0.02	0.45	.96	-0.12	0.07	.10	2.22	1.13	.05	0.13	0.06	.04
Education	Less than HS	0.00	1.72	1.00	-2.07	0.74	.01	0.16	0.12	.18	1.88	1.85	.31	-0.04	0.10	.67
Caregiver Health		-2.13	0.52	<.0001	-0.45	0.21	.04	0.02	0.03	.61	0.66	0.58	.26	-0.07	0.03	.01
Number of resources		0.27	0.14	.05	0.02	0.06	.67	0.02	0.009	.072	0.54	0.16	.0006	-0.01	0.007	.04
Number of stress		0.16	0.23	.50	0.08	0.10	.42	-0.04	0.015	.02	-1.00	0.27	.00	0.008	0.012	.49
FIM		-0.05	0.01	.0003	-0.01	0.01	.14	0.00	0.001	.02	0.03	0.02	.12	-0.001	0.001	.40
Threat		7.27	0.66	<.0001	3.05	0.28	<.0001	-0.49	0.04	<.0001	-8.84	0.73	<.0001			
PPO score					-0.07	0.05	.19	0.02	0.01	.06	0.21	0.17	.22			
RPS score								0.02	0.01	.04	0.10	0.16	.50			
Threat × Time		-0.08	0.09	.36	-0.11	0.04	.01	0.02	0.01	.0005	0.10	0.12	.39			
PPO score × Time					0.00	0.01	.84	0.00	0.002	.94	0.00	0.03	.97			
RPS score × Time								0.00	0.002	.82	0.01	0.03	.83			

^aAdjusted for patient gender, caregiver gender, caregiver age, relation to patient.

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Figure 2. Growth curve for the CPSI and WLC groups over time

tors for participants in the GCM analysis. Baseline mean scores are described here to provide a context for interpreting the scores. Mean baseline scores reflected: (a) a little to moderate anxiety, (b) feeling somewhat well prepared for caregiving, (c) no change in life change outcomes, (d) effective family functioning, (e) survivor function approaching moderate assistance, and (f) moderate depression (CES-D 21-26) (Unutzer, Patrick, Marmon, Simon, & Katon, 2002). Whereas average threat appraisal scores were in the “neither agree, nor disagree” range, benefit scores reflected positive appraisal of

caregiving. Perceived health scores approached good (2 on a scale of 0–3). On average, caregivers indicated that positive scale items (PPO, rational) were “moderately true” for them. They indicated that negative items (NPO, impulsive, and avoidance) were “slightly true” of them. IEQ resource scores ranged from 0 to 12 and IEQ stress scores ranged between 0 and 5.

Intervention Effects for Study Completers

As seen in Table 4, the short-term outcomes are encouraging for depression and life change in the CPSI participants, who received treatment and stayed in follow-up. The repeated measures ANOVA indicated T2 differences in change scores favoring the CPSI for depression (Group $\times$ Time: $F_{2, 238} = 3.43, p = .035$) and life change (Group, $F_{1, 118} = 4.68, p = .033$), ($N = 121$).

Mediator effects. Hypothesis 2 that coping variables would mediate outcome change was supported partially (Table 3). Threat was a significant mediator for four outcomes. Higher threat was related to more negative life change, poorer preparedness, and greater depression and anxiety. Greater rational problem-solving was significantly related to greater preparedness. Although T2 Benefit appraisal change was significantly greater in the CPSI in univariate analysis (Table 2), it was not a significant mediator.

Several covariates were related to caregiver outcomes in the intention-to-treat analysis (Table 3). White race and less than high school education were related to worse family functioning and greater anxiety, respectively. Poorer health was

Table 4. Study Completer Outcome and Health Change Scores: Means and Standard Deviations (SD)

	Baseline		Time 2		Time 3		Time 4	
	<i>n</i> = 55	<i>n</i> = 66	<i>n</i> = 55	<i>n</i> = 66	<i>n</i> = 55	<i>n</i> = 66	<i>n</i> = 55	<i>n</i> = 66
Measure	CPSI	Control	CPSI	Control	CPSI	Control	CPSI	Control
CES-D	24.06 (9.68)	21.50 (8.47)	–11.06 (11.94)*	–6.43 (10.96)	–9.68 (11.09)	–7.53 (11.60)	–7.93 (12.57)	–7.17 (11.28)
Anxiety	6.93 (4.72)	7.27 (4.23)	–2.56 (3.85)	–1.98 (4.34)	–2.57 (3.57)	–2.95 (4.47)	–1.96 (4.17)	–2.78 (4.31)
Prepare	2.47 (0.68)	2.56 (0.64)	0.49 (0.48)	0.24 (0.60)	0.48 (0.52)	0.33 (0.70)	0.50 (0.71)	0.44 (0.60)
Bakas	53.15 (10.62)	55.30 (9.01)	4.92 (8.53)*	1.41 (12.06)	4.29 (9.34)	1.09 (10.37)	4.60 (8.79)	1.75 (11.88)
FAD	1.90 (0.41)	1.94 (0.48)	0.00 (0.39)	0.02 (0.42)	0.09 (0.46)	0.02 (0.46)	0.07 (0.48)	–0.03 (0.51)
Health	1.75 (0.73)	1.97 (0.61)	0.12 (0.73)*	–0.18 (0.59)	0.07 (0.66)	–0.15 (0.66)	0.02 (0.74)	–0.23 (0.78)

Notes. Baseline scores are the initial values. No significant difference between groups was found at baseline.

For change scores at T2, 3, 4, Higher positive change is desired for Prepare, Bakas, and Health. Greater negative change is desired for CES-D, Anxiety, FAD.

Variable Names: CES-D = Center for Epidemiologic Studies-Depression Anxiety, Prepare = Caregiving Preparedness scale, Bakas = Bakas Caregiving Outcomes Scale, FAD = McMaster Family Assessment Device, CPSI = Caregiver Problem-solving Intervention.

* $p < .05$ for between group differences.

related to greater depression, anxiety, and worse family functioning. Greater resource use was related to better family functioning and life change and a greater number of stressors was related to poorer preparedness and more negative life change. Lower survivor functioning was related to greater depression and lower preparedness.

Exploratory question. Perceived health change did not differ between groups across all times (Group, $F_{1, 110} = 4.02$, $p = .047$), but the post hoc test was significant at T2 ($p = .028$).

Discussion

Although the primary hypothesis that the CPSI intervention would result in improved outcomes was not supported in the GCM analysis, there were several trends in the data that suggest a impact from the treatment program. The models indicated a better rate of change in depression, favoring the CPSI through 6 months in the unadjusted model. This pattern was similar for anxiety, preparedness, and life change. The study design and greater attrition in the CPSI may have contributed to the convergence of group scores after 6 months when 33 WLC caregivers accepted the optional post 6-month intervention (Figure 1). Among 121 study completers, significant results favoring the CPSI were observed for T2 change in depression, life change, and health. However, these gains faded by 6 months. The decrement in outcomes after 6 months (T3) suggests the need for a second wave of intervention with increased intensity, particularly for caregivers who remain distressed. The outcome may reflect a lack of sustained impact for a short-term intervention delivered at the beginning of a typically, changeable period of stress for caregivers. Stroke recovery is noteworthy for being lengthy and uncertain. Survivors and caregivers may defer painful conclusions about loss of independence and productivity until the promise of recovery through therapy begins to fade, often around 6 months. Caregiver stamina and the types of problems they face may fluctuate over a similar lengthy time course.

Our findings on family functioning contrast with the other studies that reported improved family functioning in caregivers receiving education-counseling or problem-solving treatment compared with controls in the first year post stroke (Clark, Rubenach, & Winsor, 2003; Evans et al., 1988). Clark et al. found no difference in depression and Evans et al., did not assess depression. Their use of family counselors as interventionists may have resulted in a greater emphasis on family issues than our treatment.

With few exceptions (Elliott, Brossart, Berry, & Fine, 2008; Grant et al., 2002; Rivera, Elliott, Berry,

& Grant, 2008) stroke and other disability and cancer caregiver studies have not found treatment effects for emotional well-being (Bakas et al., 2009; Hartke & King, 2003; Perrin et al., 2010; Toseland, Blanchard, & McCallion, 1995; van den Heuvel et al., 2002). Similarly, physical well-being and health outcomes have not improved (Bakas et al., 2009; Grant et al., 2002; van den Heuvel et al., 2002). In the current study, which included problem-solving sessions on self-care and health, perceived health was significantly better in the treatment group in the short-term. Although we showed treatment effects for depression, life change, and perceived health, results must be viewed with caution because they were not sustained and were observed only in caregivers who completed all assessments. In contrast with our findings, preparedness has shown short-term improvement in problem-solving and needs-based interventions (Grant et al., 2002; Shyu, Chen, Chen, Wang, & Shao, 2008).

The second hypothesis regarding important mediators was partially confirmed. Threat appraisal and rational problem-solving mediated outcomes, such that higher threat effected greater depression, anxiety, worse life change, and lower preparedness, and lower rational problem-solving was related to poorer preparedness. The findings on threat were similar to our cross-sectional sample ($N = 253$) in which threat was related to greater anxiety, negative life change, and lower preparedness (King et al., 2010a). In contrast with two studies that showed greater posttreatment improvement in threat appraisal in treatment caregivers (Bakas et al., 2009; Northouse, Kershaw, Mood, & Schafenacker, 2005), our intervention had no between group effect on threat levels. Threat appraisal has a detrimental effect on mood, thus a greater emphasis on reducing fears for the future and increasing self-confidence may be needed. These findings suggest that addressing perceived threat and focusing on self-care and healthy behaviors could increase the impact of future early interventions.

Difficulties with recruitment and attrition in our study reflect the challenge of accessing this distressed group, who were enrolled during the most stressful time poststroke (King & Semik, 2006). Attrition is a major challenge because stroke caregivers enrolled during acute rehabilitation tend to drop out at high rates (Mant, Carter, Wade, & Winner, 1998; Teel, Duncan, & Lai, 2001). Survivor function was low at baseline and improved markedly by T2, nevertheless lower function contributed to increased depression and lower preparedness (Table 3). Improved survivor function

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Key Practice Points

- Findings suggest that addressing caregiver perceived threat and focusing on self-care and healthy behaviors could increase the impact of future interventions.
- The one year follow-up provides evidence that caregiver coping and adaptation continue to fluctuate in the long-term.
- The significant moderators (health, stress, resource use, and survivor function) and mediators of (threat and rational problem-solving) have potential to change when targeted in interventions.
- The 75% incidence of depression in study caregivers, who were screened for depression risk during acute rehabilitation, was higher than the prevalence of 30% to 50% found in studies across the caregiving trajectory.

may have contributed to attrition, if those caregivers were less distressed and no longer saw a need for the intervention. As noted in the intervention evaluation by caregivers who dropped out, they did not perceive the treatment as very helpful. However, most of them completed only one session. The inclusion in the GCM analysis of caregivers who completed few or no treatment sessions likely contributed to the lack of significant findings. Depression was not related to attrition; however, this may be because the severity and rate of depression are much higher than other caregiver studies. Only eight percent had scores less than 12. Attrition is as high as 30%–50% in depression trials (Casacalenda, Perry, & Looper, 2002). Moreover, a higher percentage of low income Black caregivers dropped-out. A recent review indicated that despite greater depression in poor, minority women, they are less likely to seek and remain in treatment (Grote, Zuckoff, Swartz, Bledsoe, & Geibel, 2007). Those authors suggested the addition of engagement interviews and motivational interviewing to improve retention. Such techniques could be useful in developing a strong, supportive relationship with a caregiver to instill hopefulness that participation in an intervention to manage stress would be time well spent.

Limitations

The sample was primarily female, fairly well-educated, spousal caregivers, limiting generalization to similar caregivers. The findings and related literature suggest that interventions for stroke caregivers may need to include a motivational element to overcome reluctance to obtain help and to take time to continue to access it. In addition, there is a need for more sustained contact over time to build and maintain relationships and promote caregivers' motivation to care for themselves (Visser-Meily

et al., 2005). High attrition may have introduced bias into the GCM analysis because attrition was significantly higher in the CPSI group. Depression tended to improve for both groups over time; however, the highest depression scores (baseline scores) for drop outs were used in the analysis. Intention to treat analyses were not found for stroke caregiver interventions, thus it is difficult to compare those findings with others. Although, the post-intervention improvements in life change, depression, and perceived health are encouraging, they were not maintained and all the hypothesized mediator effects and effects for other outcomes were not demonstrated. These findings argue for refinements to strengthen the intervention and to develop innovations to improve retention and sustain improvement.

Clinical Implications

The 1 year follow-up provides evidence that caregiver coping and adaptation continue to fluctuate in the long-term. This suggests that caregivers need to be informed early that feelings of stress may vary over a considerable period of time and warrant attention throughout the first year of stroke recovery. The knowledge that White race and less than high school education contribute to negative outcomes for family functioning, and anxiety, respectively, can alert clinicians to potential adaptation issues. The moderators (health, stress, resource use, and survivor function), and mediators (threat and positive problem-solving) that were related to outcomes; all have potential for change when targeted in interventions. The findings that threat and positive problem-solving mediate adaptation, provides valuable direction for interventions to increase caregiver skills in managing problems and improving their well-being. Findings also suggest the characteristics of at risk caregivers in need of early referral for mental health intervention. The finding of a relationship between race, education, resource use, stress, and baseline health and outcomes may help to refine future treatment programs.

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