Telephone-Based Problem-Solving Intervention for Family Caregivers of Stroke Survivors: A Randomized Controlled Trial

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Objective: Intervention trials for stroke caregivers after the early poststroke period are lacking. To address this gap, we examined the effectiveness of a problem-solving intervention (PSI) for stroke caregivers who provided care for at least 6 months and who experienced significant strain in their role. Method: One hundred twenty-two family caregivers (age = 66.2 years, 77.9% female) were randomly allocated to a PSI or control group. The PSI was composed of 2 home visits and 18 telephone calls delivered over a 3-month intensive intervention and a 9-month maintenance period. PSI and control groups received monthly information letters in addition to usual care. Primary caregiver outcomes were depressive symptoms (measure: Center for Epidemiologic Studies–Depression Scale) and sense of competence (measure: Sense of Competence Questionnaire). Results: In covariance analyses, caregivers of the PSI group showed significantly lower levels of depressive symptoms after 3 months ($p < .01, d = -.48$) and after 12 months ($p < .05, d = -.37$), but no better sense of competence compared with the control group. Latent growth curve analyses revealed positive significant ($p < .05$) linear and quadratic effects of PSI on both primary outcomes. No effects, however, were found on caregiver social-problem-solving abilities. Conclusions: Although beneficial effects were observed among caregivers in the PSI group, the lack of effects on problem-solving abilities implies other characteristics of the intervention might account for these benefits. The relative intensity and therapeutic contact during the first 3 months of the intervention may be particularly helpful to caregivers of stroke survivors.

Keywords: family caregivers, problem-solving intervention, stroke, randomized controlled trial, depressive symptoms

Stroke is a major cause of long-term disability in Western societies. Approximately 220,000 Germans experience a first-ever stroke annually (Günster, 2011). Many of them subsequently experience persistent physical, psychosocial, and cognitive impairments (Hackett, Yapa, Parag, & Anderson, 2005; Lai, Studenski, Duncan, & Perera, 2002), making them dependent on care and help in their daily living. Most care recipients (≈ 69%) in Germany live at home, and about two thirds of them receive care only from a family caregiver without support of any formal services (Pfaff, 2011). Such caregivers may experience high levels of burden, depressive symptoms, and adverse effects on social relations (Scholte op Reimer, de Haan, Rijnders, Limburg, & van den Bos, 1998; Visser-Meily et al., 2009). Depression, loneliness, anxiety, memory loss, and bowel control problems seem to be the most stressful stroke survivor problems for caregivers (Haley et al., 2009). Caregiver adjustment to these problems is best understood as a dynamic process over time (Pearlin, Mullan, Semple, & Skaff, 1990). But only a few studies have focused on the long-term adjustment of family caregivers of stroke survivors (Gaugler, 2010). One of the available studies found that spousal caregivers experience decreasing distress over the first 3 years after stroke. However, harmony in their interpersonal and personal relationships decreased, and after an initial decline, their long-term depressive symptoms increased (Visser-Meily et al., 2009).
Pearlin’s et al. (1990) stress process paradigm is perhaps the most frequently used theoretical model to describe caregiver adjustment. It differentiates between (a) background and context factors, (b) primary-care-related stressors, (c) secondary role and intrapsychic strains, (d) effects (i.e., on mental and physical health), and (e) mediators that can potentially intervene at multiple points along the stress process. Important mediators of caregiver adjustment include cognitive appraisal, coping strategies, and coping resources. Several psychological interventions can have a positive impact on these mediators irrespective of their underpinning models, such as family systems theory, cognitive behavior therapy, social problem-solving training, or coping skills training (Eldred & Sykes, 2008). While there is insufficient evidence to confirm the efficacy of specific psychological interventions for caregivers of stroke survivors to date, the promotion of adequate coping strategies such as active problem-solving and support-seeking behavior seems particularly promising (Visser-Meily, van Heugten, Post, Schepers, & Lindeman, 2005).

The prevailing conceptualization of problem solving articulated by D’Zurilla and Nezu (2006) is based, in part, on Lazarus’ relational model of stress (Lazarus & Folkman, 1984) but with an emphasis on problem solving as a general coping strategy. The reciprocal relations of stressful life events, emotional stress responses, and problem-solving coping are the basic components of this framework. D’Zurilla and Nezu (2006) defined problem solving as a “self-directed cognitive behavioral process by which a person attempts to identify or discover effective or adaptive solutions for specific problems encountered in everyday living” (p. 11). Effective problem solving is “an important mediator of the relations between stressful life events and personal-social functioning” (p. 71). The problem-solving process includes problem identification, generation of solutions, and solution implementation as major components. Problem-solving abilities are conceptualized into constructive (positive orientation, rational approach) and dysfunctional (negative orientation, avoidant and careless tendencies) styles that are differentially related to adjustment, and these styles can be addressed in cognitive behavioral interventions (D’Zurilla & Nezu, 2006). A negative problem-solving orientation is associated with increases in depression and decreases in well-being reported by stroke caregivers over 13 weeks postdischarge (Grant et al., 2006). Similarly, a dysfunctional problem-solving style is indirectly predictive of depressive symptoms in caregivers 1 month after the stroke survivor’s discharge from rehabilitation (Shamugham, Cano, Elliott, & Davis, 2009).

Problem-solving interventions (PSI) with caregivers can “(a) enhance caregiving skills and (b) minimize the stressful nature of the caregiving role” and effective problem-solving abilities may benefit caregivers by promoting a “sense of mastery or control, which in turn, contributes to positive mental health” (Nezu, Palmatier, & Nezu, 2004, p. 224). Indeed, problem-solving abilities have been considered important in stroke caregiving for some time, and problem-solving interventions can be provided in group settings, during individual home visits, or via telephone contacts (Lui, Ross, & Thompson, 2005). Accumulating evidence indicates that problem-solving training can be effectively provided to family caregivers through telephone sessions (with caregivers of stroke survivors: Grant, Elliott, Weaver, Bartolucci, & Giger, 2002), through videoconferencing (spinal cord injury: Elliott, Brossart, Berry, & Fine, 2008; pediatric brain injury: Wade, Carey, & Wolfe, 2006), and via a combination of telephone sessions and home visits (traumatic brain injury: Rivera, Elliott, Berry, & Grant, 2008). Problem-solving interventions adapted for use with long-distance telecommunications may be particularly helpful for caregivers who face time demands and limited resources that restrict their ability to pursue traditional face-to-face psychological services (Grant, 1999).

A specific strength of problem-solving training is the emphasis on identifying and addressing the unique and immediate problems facing the individual caregiver. Family caregivers of stroke survivors typically experience shifts in the types of problems they encounter over several months of caregiving (Grant, Glandon, Elliott, Giger, & Weaver, 2006). The support needs of these caregivers vary during five phases that occur in the wake of a stroke: (a) event/diagnosis, (b) stabilization during acute care, (c) preparation during acute care and in-patient rehabilitation, (d) implementation during the first few months after patient returns home (“learning the ropes”), and (e) long-lasting adaptation at home (Cameron & Gignac, 2008). In this last phase, abilities of the care recipient tend to stabilize, and caregivers become increasingly aware of personal consequences of providing care, such as restrictions in their social life, competing demands and roles, need for respite, increasing awareness of an uncertain future in regard to possible new adverse health events, changes in their own health, or ability to continue with caregiving. Unfortunately, most studies of psychosocial interventions with caregivers of stroke survivors examine interventions provided during Phase 3 or Phase 4 (Lui et al., 2005; Visser-Meily et al., 2005). Many studies of problem-solving training for stroke caregivers suffer from poor quality, an absence of a conceptual foundation for the intervention, or the fact that the conceptual foundation does not appear to influence effectiveness (Brereton, Carroll, & Barnston, 2007; Lui et al., 2005).

We conducted a randomized controlled trial to evaluate the impact of a telephone-based PSI to distressed family caregivers of stroke survivors. The intervention was delivered during the adaptation phase and compared with an information-only group. We defined the adaptation phase as a period from 6 months after the stroke survivor returned home to up to 5 years later. The restriction to 5 years was chosen due to lack of literature on stroke caregiver adjustment after this period of time and to our desire to study the intervention in the context of stroke aftercare. Based on previous work with family caregivers (Elliott et al., 2008; Grant et al., 2002; Rivera et al., 2008), we tailored the intervention to help caregivers cope more effectively with their primary care-related stressors as well as their secondary role and intrapsychic strains. We hypothesized that participants receiving the PSI would report a reduction in their depressive symptoms and an improved sense of mastery in the caregiver role.

Method

Recruitment

Prospective participants were mainly identified from stroke patient records at two large rehabilitation facilities in the greater metropolitan area of Stuttgart and from a statutory health insurance program (see Figure 1). Stroke survivors and (if data were available) their caregivers were informed by letter about the study, the assessment for eligibility, and a follow-up telephone call by the
Figure 1. Participant flow in the study. PSI = problem-solving intervention; T = Time.
study team. A telephone number was provided to give individuals an opportunity to opt out of the telephone call. In every telephone call from the study team, the prospective participant was asked whether he or she was interested in the study and the screening interview. Data from those who showed no interest and declined to participate were not recorded due to review board expectations to respect patient confidentiality and personal prerogatives for research participation. Further recruitment resulted from spreading information about the study at local ambulant nursing services, practices of medical professions, and self-help groups.

For inclusion in the study, caregivers had to provide care to a stroke survivor who (a) was 60 years or older at the time of the most recent stroke (loss of neurological function due to an ischemic or hemorrhagic intracranial vascular event), (b) was in need of care (minimum of 1.5 hr per day on average, including assistance in activities of daily living and household duties) or supervision (when cognitive impaired or mentally ill) according to the social legislation and the eligibility criteria for benefits from the German statutory nursing care insurance, (c) did not have a terminal severe disease, and (d) did not plan to move into a nursing home within the next 6 months. To be eligible, the caregiver had to (a) reside in the metropolitan area of Stuttgart, (b) be at least 18 years old, (c) have provided assistance in activities of daily living and household duties or supervision to a stroke survivor for at least 10.5 hr per week for (d) at least 6 months to 5 years after the (last) stroke, (e) have telephone access, (f) be able to communicate on the phone, and (g) report distress associated with caregiving (endorsing at least two of six items asking if they felt overwhelmed, needed to cry, were angry or frustrated, felt isolated, experienced moderate to high levels of general stress, or felt their health had declined; Belle et al., 2006). Caregivers were excluded if they (a) were cognitively impaired (score on a dementia screening test < 9; Kalbe, Calabrese, Schwalen, & Kessler, 2003), (b) had a severe unstable or progressive disease, (c) were not able to understand and speak German, (d) were enrolled in another clinical trial for caregivers, or (e) were currently receiving psychotherapy.

Figure 1 depicts the numbers of individuals contacted, screened, and excluded. Out of 621 caregivers who were assessed for eligibility, 197 (31.7%) refused screening or study participation. In this group, the percentage of male caregivers was slightly higher compared to the group of those who enrolled (27.4% vs. 22.1%). Further data of those who declined to participate are not available due to the described recruitment guidelines. Spontaneously mentioned reasons for nonparticipation included no interest in participating in any study, no need for such kind of intervention or support, refusal of any home visits, participation was seen as a further stressor, or dissatisfaction with the stroke rehabilitation in the recruiting rehabilitation clinic. The most frequent reasons for exclusion after the telephone screening interview were no distress in the caregiving role (n = 218) and insufficient German language skills of caregivers with various migration backgrounds (n = 47).

Written consent to participate in the study was obtained from each caregiver and care recipient. Care recipients without the capacity to consent (e.g., because of cognitive impairment, severe aphasia, or both) were enrolled and assessed with the surrogate consent from the individual’s legally authorized representative. Participants were recruited from March 2007 to October 2009, and no monetary compensation was provided for participation.

Participants

Consenting participants included 27 men (22.1%, M age = 69.78 years, SD = 9.09) and 95 women (77.9%, M age = 65.13, SD = 10.01) in caregiver roles for persons after stroke. The sample comprised 100 native Germans (82.0%), 10 ethnic German repatriates from Eastern European states (8.2%), and 12 individuals with various European migration backgrounds (9.8%). At enrollment, 23 participants (18.9%) had worked while providing care. The caregivers were spouses or partners (n = 106, 86.9%), children (n = 15, 12.3%), or grandchildren (n = 1, 0.8%) of the care recipient and had been providing care for a mean period of 28.00 months (SD = 33.06). During the last 3 months before enrollment, they provided care and support in activities of daily living for 1.98 hr (SD = 1.70) per day on average, additional support (e.g., preparing meals, buying goods, doing the laundry, providing outdoor assistance) for 3.72 hr (SD = 2.32), and supervision due to cognitive impairment (e.g., disorientation, impaired memory, poor judgment) for 1.75 hr (SD = 3.62). Fifteen caregivers (12.3%) were also responsible for the care of a second person who had not been enrolled in the study. Participating care recipients included 84 men (68.9%, M age = 73.05, SD = 7.33) and 38 women (31.1%, M age = 73.37, SD = 7.89). Thirty-five stroke survivors (28.7%) had already experienced more than one stroke in the past. Forty-one care recipients (33.6%) had aphasia, 37 (30.3%) had dysphagia symptoms, and 71 (58.2%) were incontinent.

Study Design

All caregiver dyads were assessed at baseline (T0), after the intensive intervention period at 3 months (T1), and after the maintenance period at 12 months (T2). Assessors were trained research assistants who were blind to the treatment condition and supervised every 6 to 8 weeks by the third author. Assessments were conducted in the home of the caregiver or care recipient. Paper-and-pencil questionnaire administration was only used for assessing caregiver strain and depressive symptoms so it would be easier for the caregiver to give candid answers when the care recipient was present. The other scales were administered by interview.

All participants who completed the PSI condition were asked for some further feedback on the PSI in regard to aspects such as intensity, the manner of delivery, and the provided materials after T2. Because the assessors were blind to the group allocation, these questions were mailed (with a self-addressed stamped envelope) by another person. Telephone follow-ups at 24 and 36 months that focused almost exclusively on health care economics are not included in this report.

After baseline assessment, caregiver dyads were randomly assigned to the PSI or control group. Assignment was stratified for caregiver’s gender and relationship to care recipient (spouse vs. children or grandchildren). Computer-generated, controlled random allocation of participants was provided by an independent randomization center at the University of Tübingen. The study protocol was approved by the ethics committee of the University of Tübingen (registered at www.isrctn.org as ISRCTN86289718). All materials used are published in detail separately (GKV–Spitzenverband, 2011).
Problem-Solving Intervention (PSI)

The first component of the PSI included an initial in-home visit, five weekly (Month 1), and four biweekly (Months 2 and 3) telephone sessions. In the following maintenance period (Months 4–12), the second component consisted of another in-home visit (Month 4) and nine monthly telephone sessions. In case of crisis or severe symptomatology, four additional telephone sessions could be provided during the maintenance period. The duration of each call and each home visit was limited to 60 and 150 min, respectively, to stay in the range of comparable formal services and to limit the variation of the total intervention time.

The intervention was based on the problem-solving model developed by D’Zurilla and colleagues (D’Zurilla & Goldfried, 1971; D’Zurilla & Nezu, 2006; D’Zurilla, Nezu, & Maydeu-Olivares, 2004) and included the following six problem-solving steps: (a) problem definition and facts, (b) optimism and orientation, (c) goal setting, (d) generation of alternatives, (e) decision making, and (f) solution implementation and verification. The six components were viewed as a continuous and interlinking process rather than stages to be followed in serial order.

During the initial in-home face-to-face session, the interventionist explained the purpose of the intervention in detail and gave a short introduction into the principles of problem solving and the written problem-solving guide. In accordance with previous work (e.g., Kurylo, Elliott, & Shewchuk, 2001), we started the intervention with capturing the facts and identifying specific burdensome issues the caregiver is willing to change as a basis for a shared agenda. To facilitate problem identification, we developed a card-sorting task. The essential element of this approach was a set with 40 cards covering possible problems based on previous work and a previous set (Elliott & Shewchuk, 2000; Kurylo et al., 2001), the literature on stroke caregiving, and a pilot application with eight stroke caregivers. A single statement (e.g., “I miss support,” “Our interactions are testy or aggressive,” and “I have to do the housework”) was listed on the front and back of each card. The front of the card had a red symbol, and the back had a green symbol. The card sort was structured in the following way: The cards were presented to the caregiver; he or she was told that the cards described specific challenges faced by many stroke caregivers, and the caregiver was asked to separate the cards applicable to the current situation from the ones that were not. Blank cards were available for additional problems that were not covered by the existing set. Caregivers were asked to rate the degree of burden (on a 5-point scale ranging from not at all burdensome to very burdensome) described on each card relevant to their situation. They were then asked to allocate the cards to one of the five burden categories and turn cards allocated at the “no burden” or “little burden” categories to the site with the green symbol. The interventionist used the cards to assist the caregiver in developing a sense of optimism in regarding his or her abilities to solve problems (e.g., through recognizing that many other caregivers have similar problems, that specific obstacles and problems are more manageable, or seeing one’s own strategies of successful problem solving). Finally, caregivers were instructed to group the cards with related problems and to name each group. This technique helped the caregivers to think about how problems might overlap or share similar characteristics.

On the basis of the cards, the interventionist encouraged the caregiver to be more aware of problems when they occur, recognize their own emotional cues as an aid to identifying problems, and thereby recognize when problem solving is applicable. Different problem-solving styles were addressed and referred to the cards if possible. At the end of the card-sorting task, the caregiver was asked to select and prioritize the burdensome problems that needed immediate attention. The caregiver was instructed to seek all available facts of the selected problem, to separate facts from assumptions, to differentiate relevant from irrelevant information, and to indicate how he or she initially reacted to the situation (emotionally and behaviorally). After collecting the facts, the caregiver was assisted in articulating a specific, realistic goal to overcome the identified problem and in determining possible obstacles to meeting the established goal. In the following step, the caregiver was instructed to think of as many solutions to the problem or the obstacles as possible and to write down each on a worksheet. At this point, the caregiver was reinforced for deferring judgment. Various techniques were offered to increase the number of alternative strategies (e.g., combining different solutions, asking what would a role-model think or say in the actual situation, recalling potential solutions to other similar problems that were evaluated during the card-sorting procedure). Further alternatives generated by the experienced interventionist or other experts could be incorporated into the brainstorming activity.

After completing a most comprehensive list of possible solutions, we encouraged the caregiver to consider the potential outcomes of the chosen solutions and weigh the perceived benefit and feasibility of each on a 5-point rating scale. This step was an important point of the “stop and think” paradigm and was based on the facts and goals identified earlier in the process. The final phase in the problem-solving process was the act of implementing the chosen and carefully planned solution. The caregiver was asked to review the match of desired versus actual outcome of his or her problem-solving efforts and to give feedback at the next contact with the interventionist. This self-monitoring component was crucial to promote understanding about what made the chosen solution effective or ineffective and how to implement similar or alternative solutions in future problem situations.

Throughout training, the interventionist used adjunctive cognitive behavioral therapy techniques like role playing, modeling, shaping, reinforcement, or cognitive restructuring to reduce cognitive overload and negative orientation such as negative thinking, ruminating, or emotional dysregulation. A written guide to problem solving with example cases and worksheets was developed and provided to each caregiver of the PSI group. This brief description of the intervention emphasizes how much the problem-solving steps intersected. In comparison to D’Zurilla and Nezu (2006), all problem-solving steps were introduced in the initial home visit and not in subsequent sessions.

The card-sorting task and the problem-solving process were also part of the second in-home session. The telephone sessions were structured as follows: Initial greeting and getting an impression about the caregiver’s current condition; reviewing any progress on the problems, goals, and planned activities identified in the previous session; and discussing modifications of goals, strategies, or motivational issues. When necessary, this structure was applied to further problems that had not been addressed yet or had arisen over
time. The PSI group also received the same monthly information leaflets like the information-only control group.

**Therapists**

Two clinical psychologists experienced in providing cognitive behavioral interventions with older persons conducted the PSIs. The therapists recorded all problems and goals of each session according to a protocol. The records were complemented with comments on difficulties that arose during the sessions, as well as ratings on the perceived quality of the session, the quality of the therapeutic alliance, and the actual degree of burden in regard to the major problems. The two therapists met weekly for on-site exchange regarding all participants of the PSI group. They were supervised every 6–8 weeks for 3–4 hr by the third author, who had access to the protocols of the sessions. During these contacts, all participants in the PSI group were discussed based on the basis of the interventionists’ records and in regard to study protocol adherence, intervention process, and possible difficulties. If needed, telephone-based supervision was possible at each point in time.

**Information-Only Control Group**

An information-only control group was used to approximate a bona fide treatment alternative critical to understanding the comparative effects of PSI (Malouff, Thorsteinsson, & Schutte, 2007). Participants assigned to this group received monthly information letters with care-specific topics like relaxation, pain, depression, and nutrition, as well as addresses for supporting services or groups in the region corresponding to available written material offered by health insurances or local information centers.

Both PSI and control groups received the usual support for care recipients and their caregivers that was regulated by law and the various benefits provided by the compulsory long-term-care insurance. The benefits depended on the need for care, support, and supervision and could consist of direct payments or reimbursement of professional ambulant and inpatient-services up to a specific monthly amount. All beneficiaries received up to four mandatory in-home counseling visits per year, depending on the statutory long-term care needs assessment.

**Measures Used in the Analyses**

We expected that PSI would have a beneficial impact on caregiver depressive symptoms and sense of competence (Nezu, Nezu, & Perri, 1989). Consequently, the primary outcomes included measures of these two domains. We also expected that caregivers in the PSI group would report positive increases in their social problem-solving abilities in response to treatment. Based on prior research linking problem-solving training with increases in caregiver social functioning (Elliott & Berry, 2009) and decreases in health complaints (Rivera et al., 2008), we included secondary outcomes of leisure time satisfaction and physical complaints.

**Primary outcome measures.**

**Caregiver depression.** Depressive symptoms were assessed with the 20-item Center for Epidemiological Studies–Depression Scale (CES–D; Hautzinger, Bailer, Hofmeister, & Keller, 2012; Radloff, 1977). Total scores range from 0 to 60. A score of 16 or higher has been used as an indicator of clinical severity (Craig & Van Natta, 1978), and previous research suggests this cutoff score can be used to reveal important and meaningful differences between stroke caregivers who exceed this threshold and those who do not (Grant, Bartolucci, Elliott, & Giger, 2000).

**Caregiver competence.** Caregiver mastery was assessed with the Sense of Competence Questionnaire (SCQ; Vernooij-Dassen, 1993). The SCQ contains 27 items, each rated on a 4-point scale. The three domains of the SCQ—satisfaction with the stroke patient as a recipient of care, satisfaction with one's own performance as a caregiver, and consequences of involvement in care for the personal life of the caregiver—have been confirmed for informal caregivers of older adults with diagnosed stroke (Scholte op Reimer, de Haan, Pijnenborg, Limburg, & van den Bos, 1998). A higher total score indicates a greater sense of competence (Jansen et al. 2007; Vernooij-Dassen, 1993) or with a reversed scaling, a higher burden (Scholte op Reimer, de Haan, Pijnenborg, et al., 1998). Total scores range from 27 to 135. The competence scoring was used in the German validation (Krüger, 2008) and in this study.

**Secondary outcome measures.**

**Social problem-solving abilities.** Caregiver social problem-solving abilities were assessed with the short version of the Social Problem Solving Inventory—Revised (SPSI–R:S; D’Zurilla, Nezu, & Maydeu-Olivares, 2002; Graf, 2003). The SPSI–R:S has 25 items that are rated on a 5-point scale ranging from 0 (not very true of me) to 4 (extremely true of me). The total score ranges from 0 to 100. Two constructive dimensions (positive problem orientation [PPO], rational problem-solving [RPS]) and three dysfunctional dimensions (negative problem orientation [NPO], impulsivity/carelessness style [ICS], and avoidance style [AS]) can be differentiated. The total score serves as a global index of problem-solving ability. Higher scores indicate better problem-solving abilities. Raw scores can be transformed into standard scores for different age groups (D’Zurilla et al., 2002).

**Physical complaints.** Physical complaints were assessed with the Giessen Subjective Complaints List (GBB–24; Brähler, Hinz, & Scheer, 2008). The intensity of each complaint is rated on a 5-point scale, ranging from 0 (not existing) to 4 (strong). The scores of the 24 items are summed to a total score (from 0 to 96). Mean scores in the general population of Germany are 14.99 (41–60 years) and 20.87 (> 60 years) for women and 12.20 (41–60 years) and 17.71 (> 60 years) for men (Brähler et al., 2008).

**Satisfaction with leisure time.** Caregivers often report restrictions in pleasant recreational activities, and these restrictions are significantly associated with increases in depression (Mausbach et al., 2011). The Leisure Time Satisfaction (LTS; Stevens et al., 2004) questionnaire was used to measure the impact of PSI on the caregiver’s satisfaction with his or her leisure time. Items are rated on a Likert-type scale ranging from 0 (not at all) to 2 (a lot). The total score ranges from 0 to 12, and higher scores reflect greater satisfaction. In the validation study (Stevens et al., 2004) the median of the LTS was 5 in a sample of 1,229 dementia caregivers (M age = 62.3 years).

**Other baseline measures.** We included additional measures at baseline of caregiver and care recipient characteristics that could potentially influence caregiver adjustment.
Spiritual beliefs. Caregiver adjustment has been related to religious and spiritual beliefs (Harris, Allen, Dunn, & Parmelee, 2013). To measure this domain as a potentially mediating variable in coping with stress, we used the Beliefs and Practices subscale of the Systems of Belief Inventory (SBI–15R; Holland et al., 1998) at baseline. The total scores range from 0 to 56. Higher scores indicate stronger religious and spiritual beliefs.

Informal support and health care service use. Social integration, emotional support, and practical support can also influence caregiver adjustment. Therefore, we assessed caregiver informal support with the German Social Support Questionnaire (F–SozU; Fydrich, Sommer, & Brähler, 2007) at baseline. Scores on this measure range from 0 to 56. Informal and professional support (mobile nursing services, respite care) in care or supervision of the stroke survivor, and health care service use (physical consultations, therapies or physical training groups, psychological counseling or therapies, self-help groups) of the caregivers were assessed at all three measurement points. Support or service use data refer to the 3 months prior to each assessment.

Care recipient impairment. We used the long-term functional score of the Scandinavian Stroke Scale (SSS; Scandinavian Stroke Study Group, 1985) to assess the care recipient’s functional impairment. The total score on the SSS ranges from 0 to 48; higher scores indicate less impairment. Functional disability was assessed with the Barthel Index (BI) of Activities of Daily Living (ADL; Mahoney & Barthel, 1965). Scores on the BI range from 0 to 100; higher scores represent better ADL performance. We also assessed higher cognitive functioning (comprehension, verbal expression, social interaction, problem solving, memory/learning/orientation, and vision/neglect) with the German version of the Extended Barthel Index (EBI; Prosiegel et al., 1996). Total scores of the six items ranged from 0 to 90. SSS was assessed at T0 only, BI and EBI at T0, T1, and T2.

Finally, care recipient depressive symptoms were measured with the 10-item Montgomery–Åsberg Depression Rating Scale (MADRS; Montgomery & Asberg, 1979) at T0 and T2. Total scores range from 0 to 60. Higher scores indicate greater severity.

Data Analyses

The first set of analyses examined the comparability of the PSI and control groups to determine the effectiveness of our randomization procedure. For this purpose, demographic and self-report data from the caregiver and the care recipient were analyzed with independent samples t tests on continuous variables and chi-square tests of independence for categorical variables.

Treatment effects of the intervention were tested using two methods: (a) endpoint analyses after the main intervention period (at the third month assessment) and follow-up after maintenance period (12th month), and (b) latent growth curve modeling of PSI group trajectories on the outcome measures over time. For the endpoint analyses, we used analysis of covariance (ANCOVA) to compare treatment groups on outcomes at third and 12th month assessments, using baseline scores as a covariate. We conducted the endpoint analyses using maximum-likelihood multiple imputation to impute missing values for participants with missing data at the third and 12th months. For each outcome, 10 data sets with imputed values (based on linear regression prediction) were generated, and the ANCOVA results were pooled to obtain final estimates. The endpoint analyses were conducted using the multiple imputation and linear mixed modeling routines of IBM SPSS Version 19. The effect size estimates (in Cohen’s d metric) are based on the adjusted means and standard errors from the ANCOVAs and were calculated using the online effect size calculator (Lipsey, 2012; associated with the book by Lipsey & Wilson, 2001). Completer analyses are only reported when they differed in significance from the ANCOVAs using the pooled multiple imputation data.

Latent growth modeling (LGM) provides considerable flexibility in modeling complex change processes over time (Jackson, 2010), and it is recommended for understanding dynamic changes in stroke caregiver adjustment (Gaugler, 2010). Latent growth curve modeling using robust maximum-likelihood estimation was implemented in Mplus Version 5.21 (Muthén & Muthén, 2010). The structure of the growth models for all outcome variables is shown in Figure 2. In these models, latent intercepts, linear trends, and quadratic trends were estimated from observed measures at the three time periods. In growth modeling, the latent intercept represents the level of the outcome measure when the time variable equals 0.

In our models, time was coded 0 at the first time period so that the latent intercept reflects initial status on the outcome at baseline.
Subsequent time periods were coded to reflect months since baseline for the linear trend and the square of these loadings for the quadratic trend. The latent growth parameters (intercept and slopes) were then regressed on treatment group (the PSI group was coded as 1, the control group as 0). In all models, intercepts were treated as random effects; to achieve model identification, we treated linear and quadratic trends as fixed effects. After initial model fitting, diagnostic statistics were computed. For the caregiver, competence outcome (SCQ), two outlying cases with extreme influence (for both cases, OUTINF > 1.70, Mahalanobis distances, \( p < .001 \)) were removed, and the model was fit again. Model fit was assessed using chi-square goodness-of-fit tests (a nonsignificant test indicates good fit), the comparative fit index (CFI; values > .95 indicate good fit), root-mean-square error of approximation (RMSEA; values < .10 indicate acceptable fit, though values < .06 are preferred), and standardized root-mean-square residual (SRMR; values < .08 indicate good fit).

**Power Analysis**

We conducted an a priori power analysis based on procedures from Borm, Fransen, and Lemmens (2007) for analysis of covariance in randomized clinical trials. To detect an expected minimum effect size of .40 (Cohen’s \( d \)) after the 12-month period with power \( \beta = .80 \) (two-sided test, \( \alpha = .05 \)), assuming a correlation \( \rho = .70 \) between baseline and follow-up assessments, 52 participants in each group were needed. A mortality rate of 15%, a rate of nursing home placements of 20%, and a drop-out rate of 5% due to other reasons were assumed for the 12-month period. Instead of 174 participants, we only randomized 122. Due to a much lower attrition rate (\( n = 20 \)), 12-month data (T2) were available from 102 participants.

**Results**

**Comparative Analyses at Pretreatment**

Table 1 provides demographic and initial status data for the treatment and control groups. At pretreatment, PSI and control groups evidenced no significant differences (\( p > .05 \)) on demographic characteristics or primary and secondary outcomes (see Table 2). More caregivers in the control condition than the PSI group received ambulant therapies like physiotherapy, massage, or sports therapy, \( \chi^2(1) = 4.52, p = .03 \), and had relatives, friends, or neighbors who assisted care recipients in ADL-related tasks, \( \chi^2(1) = 4.22, p = .04 \). In addition, there was a trend for a greater use of home care services for ADL assistance, \( \chi^2(1) = 3.31, p = .07 \), and a higher rate of aphasia among the care recipients in the PSI group, \( \chi^2(1) = 3.44, p = .06 \).

Significant depressive symptoms (CES–D ≥ 16) were reported by 67.2% of all caregivers (71.6% of the women, 51.9% of the men). The total standardized SPSI–R:S mean score (\( M = 99.72, SD = 12.11 \)) for all participants was within the norm group average of 86–114 (D’Zurilla et al., 2002) and differed only slightly between different age groups and sex (97.63–105.83). Compared with the corresponding group in the general population, participating male (\( n = 24 \)) and female (\( n = 69 \)) caregivers older than 60 years of age reported similar physical complaints (men: \( M = 16.83, SD = 14.45 \); women: \( M = 22.55, SD = 12.13 \)). In contrast with this, female caregivers (\( n = 24 \)) in the age group from 41 to 60 years had higher mean scores on the GBB–24 (\( M = 22.96, SD = 12.74 \)) than women in the general population at the same age (\( M = 14.99, SD = 13.0 \)).

Caregiver depressive symptoms had low to moderate correlations in expected directions with their sense of competence, \( r_{(120)} = −.56, p < .001 \); physical complaints, \( r_{(120)} = .45, p < .001 \); problem-solving abilities, \( r_{(120)} = −.32, p < .001 \); and leisure time satisfaction, \( r_{(120)} = −.30, p < .01 \). Of the five problem-solving dimensions, the correlations were strongest between depressive symptoms and negative problem orientation, \( r_{(120)} = .48, p < .001 \), and avoidance style, \( r_{(120)} = .29, p < .01 \).

**Treatment Adherence and Satisfaction in the PSI Group**

Thirteen caregivers in the intervention group were nonadherent with the protocol. They refused to take part in the intervention at all (\( n = 1 \)), discontinued intervention (\( n = 5 \)), or showed a low adherence in at least one intervention period (\( n = 7 \); see Figure 1). Ten caregivers who did not complete the intervention protocol during the intensive intervention period reported significantly higher leisure time satisfaction, \( r(56) = −2.26, p = .03 \), than participants who met the intervention protocol criteria.

During the first 3 months of the intensive intervention period, caregivers in the PSI group (\( n = 52 \)) received on average 6.3 (\( SD = 2.0 \), range 2–9) of the nine proposed telephone phone calls, with a mean length of 37 min (\( SD = 17.7 \), range 4–60 min). The interventionists spoke significantly longer, \( r(50) = 2.06, p = .045 \), with female caregivers (\( M = 280 \) min, \( SD = 160.0 \)) in these calls than with male caregivers (\( M = 178 \) min, \( SD = 132.9 \)). Years of education and total time of telephone contacts were not significantly correlated, \( r(50) = −.05, p = .76 \). But older age, \( r(50) = −.29, p = .04 \), and a negative problem orientation, \( r_s(50) = −.30, p = .03 \), were associated with less time talking on the phone during the first 3 months of the intervention.

Throughout the 9-month maintenance period, the interventionists spoke with caregivers (\( n = 48 \)) on the telephone approximately 7.8 times (\( SD = 3.7 \), range 1–13). This average total was also less than the planned nine plus four optional emergency calls. The average length of all calls during this period was 36 min (\( SD = 17.2 \), range 5–60 min).

Twenty-eight participants in the PSI group returned their feed-back questionnaire. They did not differ from those who did not respond (\( n = 23 \)) on any demographic variable (age, education, sex, ethnic background), in total time in telephone interactions, or on primary or secondary outcomes at T2. The mean satisfaction score (measured with a visual analog scale, from 0, least satisfied, to 100, most satisfied) for the intervention group was 91.4 (\( SD = 10.9 \)); nearly all responding participants (96.4%) were “mostly satisfied” or “very satisfied” (on a 5-point Likert scale) with the frequency and the duration of calls. The initial face-to-face contact was rated as “very important” by 89.3% of the caregivers. Some participants (21.5%) expressed the preference of between one and three more face-to-face contacts during the 12 months. A significant number of caregivers would have liked an earlier onset (39.3%) and a longer maintenance period (35.7%) of the PSI.
Analysis of Covariance for Endpoint Analysis

Table 2 provides the means and standard deviations for primary outcomes at each assessment point. The results for the ANCOVAs are provided in Table 3. PSI participants had significantly lower levels of depression and fewer physical complaints and experienced higher levels of leisure time satisfaction at the 3-month assessment than caregivers assigned to the control group. There was a trend ($p < .10$) indicating caregivers in the PSI group had higher caregiver competence at 3 months than caregivers in the control group. There was no effect of the intervention on caregiver social-problem-solving abilities.

For the 12-month assessment, participants receiving PSI had significantly lower levels of depressive symptoms and health complaints than control group participants. There were no significant group differences in caregiver sense of competence, leisure time satisfaction, or problem-solving abilities at the 12-month assessment.

The substantive results for endpoint analyses on complete cases were the same except for the depression scores in the PSI group at the 12-month follow-up that yielded a nonsignificant trend, $t(100) = 1.88, p = .06$. The adjusted means of depression were almost identical in the complete case and the multiple imputation analyses, so it is likely that the differences are due to higher statistical power in the imputed data sets.

Latent Growth Modeling

The results of the latent growth curve models for caregiver outcomes are depicted in Table 4. The fit statistics for all models indicate adequate fit to the data: all chi-square statistics nonsignificant, all CFIs $> .97$, all RMSEAs $< .10$, and all SRMRs but one $< .08$. Variances of random intercepts were significant for all outcomes, indicating significant individual differences in initial status. Consistent with the $t$ tests of group differences on baseline outcomes, the regression of intercepts on treatment were not sta-

---

Table 1

<table>
<thead>
<tr>
<th>Demographics</th>
<th>PSI (n = 60)</th>
<th>Control (n = 62)</th>
<th>t</th>
<th>$\chi^2$(df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
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</tr>
<tr>
<td>Caregiver Age (years)</td>
<td>66.7 (9.9)</td>
<td>65.6 (10.1)</td>
<td>−0.61</td>
<td>.54</td>
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<td>Caregiver</td>
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</tr>
<tr>
<td>Total months</td>
<td>30.0 (35.2)</td>
<td>26.0 (31.0)</td>
<td>−0.66</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>Hr/day during previous 3 months</td>
<td>7.1 (4.4)</td>
<td>7.8 (5.5)</td>
<td>0.67</td>
<td>.50</td>
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</tr>
<tr>
<td>Social support (F-SozU)</td>
<td>36.6 (10.7)</td>
<td>35.6 (10.4)</td>
<td>−0.54</td>
<td>.59</td>
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</tr>
<tr>
<td>Spiritual beliefs (SBI–15R)</td>
<td>15.8 (9.6)</td>
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<td>.21</td>
<td></td>
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<td>Education (years)</td>
<td>12.1 (3.2)</td>
<td>12.3 (3.1)</td>
<td>0.42</td>
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<td>Ethnic background</td>
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<td>German</td>
<td>51</td>
<td>85.0</td>
<td>0.10</td>
<td>.75</td>
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<tr>
<td>Female</td>
<td>46</td>
<td>76.7</td>
<td>2.72</td>
<td>.01</td>
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<td>Relationship to care recipient</td>
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<tr>
<td>Spouse or partner</td>
<td>52</td>
<td>86.7</td>
<td>0.10</td>
<td>.75</td>
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<tr>
<td>Child/grandchild</td>
<td>7/1</td>
<td>11.7/1.7</td>
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<td></td>
</tr>
</tbody>
</table>

Note. The $p$ values are based on $t$ tests to compare groups on continuous variables and chi-square tests of independence for categorical variables. PSI = problem-solving intervention group; Control = information-only control group; F-SozU = Social Support Questionnaire; SBI–15R = Beliefs and Practices subscale of the Systems of Belief Inventory; SSS = Scandinavian Stroke Scale; BI = Barthel Index; EBI = Extended Barthel Index; MADRS = Montgomery–Asberg Depression Rating Scale.

a For this variable, PSI $n = 57$; Control $n = 55$. b For this variable, PSI $n = 53$; Control $n = 57$. c Fisher’s exact test (two-tailed).
Depressive symptoms (CES–D)\textsuperscript{a}

Means (and Standard Deviations) for Primary and Secondary Outcomes

Table 2

<table>
<thead>
<tr>
<th>Measure and condition</th>
<th>Baseline (T0) (N = 122)</th>
<th>Postintensive treatment (T1; 3 month) (N = 114)</th>
<th>Postmaintenance period (T2; 12 month) (N = 101)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive symptoms (CES–D)\textsuperscript{a}</td>
<td>\textit{PSI} 20.8 (7.80)</td>
<td>17.3 (7.55)</td>
<td>15.5 (7.52)</td>
</tr>
<tr>
<td>Control</td>
<td>21.1 (10.00)</td>
<td>20.4 (9.44)</td>
<td>18.2 (10.87)</td>
</tr>
<tr>
<td>Sense of competence (SCQ)</td>
<td>\textit{PSI} 66.2 (16.43)</td>
<td>70.3 (15.47)</td>
<td>70.4 (16.23)</td>
</tr>
<tr>
<td>Control</td>
<td>65.9 (15.90)</td>
<td>66.2 (17.58)</td>
<td>68.9 (18.26)</td>
</tr>
<tr>
<td>Problem-solving (SPSI–R:S)</td>
<td>\textit{PSI} 65.3 (9.93)</td>
<td>65.4 (12.60)</td>
<td>65.9 (11.69)</td>
</tr>
<tr>
<td>Control</td>
<td>65.5 (12.41)</td>
<td>63.0 (12.47)</td>
<td>66.5 (15.89)</td>
</tr>
<tr>
<td>Physical complaints (GBB–24)b</td>
<td>\textit{PSI} 22.1 (13.23)</td>
<td>21.9 (15.59)</td>
<td>20.9 (14.19)</td>
</tr>
<tr>
<td>Control</td>
<td>21.6 (13.15)</td>
<td>25.2 (14.59)</td>
<td>23.6 (13.42)</td>
</tr>
<tr>
<td>Leisure time satisfaction (LTS)</td>
<td>\textit{PSI} 5.1 (3.36)</td>
<td>6.1 (3.38)</td>
<td>6.2 (3.25)</td>
</tr>
<tr>
<td>Control</td>
<td>5.3 (3.56)</td>
<td>4.6 (3.65)</td>
<td>5.9 (4.17)</td>
</tr>
</tbody>
</table>

Note. PSI = problem-solving intervention group; Control = information-only control group; T = Time; CES–D = Center for Epidemiologic Studies–Depression Scale; GBB–24 = Giessen Subjective Complaints List; LTS = Leisure Time Satisfaction; SCQ = Sense of Competence Questionnaire; SPSI–R:S = Social Problem-Solving Inventory–Revised: Short Version.

\textsuperscript{a} \(n = 100\) at T2. \(\hat{n} = 99\) at T2.

The fixed effects results indicate significant treatment group differences in growth trajectories for all outcomes except problem-solving abilities. There were significant linear and quadratic treatment effects for depression, caregiver competence, physical complaints, and leisure time satisfaction. Yet there were no significant linear (\(p = .11\)) or quadratic (\(p = .10\)) treatment effects for social problem-solving abilities.

As depicted in Figure 3, the growth trajectories for depression indicate a sharper decrease in depression among caregivers receiving PSI than those in the control group by the end of the 3-month intervention period, but the rate of decline in depression began to lessen thereafter. The PSI group also displayed a sharp increase in competence by the 3-month posttreatment assessment, and this remained stable through the 12-month maintenance period. The control group reported a steady increase in caregiver competence over time.

The trajectories indicate that the participants in the PSI group experienced a steady decline in physical complaints from baseline through the 12-month maintenance period. For the control group, physical complaints increased by the 3-month assessment but began to decline through the maintenance period. Finally, there

Table 3

Results of Analyses of Covariance for Caregiver Endpoint Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>PSI (Adjusted\ M)</th>
<th>PSI (SE)</th>
<th>Control (Adjusted\ M)</th>
<th>Control (SE)</th>
<th>(t)</th>
<th>(d)</th>
<th>Lower limit (95%)</th>
<th>Upper limit (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (3-month)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CES–D</td>
<td>17.3</td>
<td>0.82</td>
<td>20.4</td>
<td>0.84</td>
<td>2.62**</td>
<td>−.48</td>
<td>−.84</td>
<td>−.12</td>
</tr>
<tr>
<td>SCQ</td>
<td>69.6</td>
<td>1.22</td>
<td>66.7</td>
<td>1.24</td>
<td>−1.69</td>
<td>.30</td>
<td>−.05</td>
<td>.66</td>
</tr>
<tr>
<td>SPSI–R:S</td>
<td>64.9</td>
<td>1.12</td>
<td>62.6</td>
<td>1.3</td>
<td>−1.48</td>
<td>.24</td>
<td>−.11</td>
<td>.60</td>
</tr>
<tr>
<td>GBB–24</td>
<td>21.6</td>
<td>1.17</td>
<td>25.5</td>
<td>1.16</td>
<td>2.36*</td>
<td>−.43</td>
<td>−.79</td>
<td>−.07</td>
</tr>
<tr>
<td>LTS</td>
<td>6.1</td>
<td>0.39</td>
<td>4.6</td>
<td>0.39</td>
<td>−2.75**</td>
<td>.49</td>
<td>.14</td>
<td>.85</td>
</tr>
<tr>
<td>T2 (12-month)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CES–D</td>
<td>15.3</td>
<td>0.97</td>
<td>18.1</td>
<td>0.98</td>
<td>2.01*</td>
<td>−.37</td>
<td>−.72</td>
<td>−.01</td>
</tr>
<tr>
<td>SCQ</td>
<td>70.6</td>
<td>1.55</td>
<td>69.2</td>
<td>1.54</td>
<td>−0.62</td>
<td>.12</td>
<td>−.24</td>
<td>.47</td>
</tr>
<tr>
<td>SPSI–R:S</td>
<td>65.8</td>
<td>1.39</td>
<td>65.4</td>
<td>1.57</td>
<td>−0.21</td>
<td>.03</td>
<td>−.32</td>
<td>.39</td>
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<tr>
<td>GBB–24</td>
<td>20.1</td>
<td>1.37</td>
<td>24.0</td>
<td>1.42</td>
<td>2.16*</td>
<td>−.36</td>
<td>−.72</td>
<td>−.01</td>
</tr>
<tr>
<td>LTS</td>
<td>6.4</td>
<td>0.41</td>
<td>5.8</td>
<td>0.42</td>
<td>−0.95</td>
<td>.18</td>
<td>−.17</td>
<td>.54</td>
</tr>
</tbody>
</table>

Note. Multiple imputation results are pooled results from 10 imputation samples. PSI = problem-solving intervention group; Control = information-only control group; Adjusted \(M\) = covariate-adjusted means (baseline measure as covariate); \(d\) = Cohen’s \(d\) effect size for adjusted means; CES–D = Center for Epidemiologic Studies–Depression Scale; SCQ = Sense of Competence Questionnaire; SPSI–R:S = Social Problem-Solving Inventory–Revised: Short Version; GBB–24 = Giessen Subjective Complaints List; LTS = Leisure Time Satisfaction.

\(p < .10. \quad ^{*} p < .05. \quad ^{**} p < .01.\)
was a significant increase in leisure time satisfaction in the PSI group over 12 months, with a more prominent effect after the first 3 months. Leisure time satisfaction in the control group decreased after 3 months but began improving thereafter through the following nine months.

### Post Hoc Analysis

Similar to findings at T0, more caregivers in the control condition received therapies, $\chi^2(1) = 4.45, p = .04$, and help in nursing tasks from their informal network, $\chi^2(1) = 4.41, p = .04$, at T1 than caregivers receiving PSI. After 12 months, these differences disappeared. At T2, significantly more caregivers in the PSI group received informal support from individuals who were in charge of the care recipients from time to time than caregivers in the control group, $\chi^2(1) = 5.74, p = .02$. At T1 and T2, there were no significant differences between the groups in terms of respite care, ambulant nursing services, physical consultation, psychological counseling or therapy, and attendance in self-help groups.

In analyzing the subscales of the SCQ, we found that the trajectories of the latent growth curve model revealed significant linear ($B = 0.88, SE = 0.37, t = 2.40, p = .02$) and quadratic treatments effects ($B = -0.07, SE = 0.03, t = -2.51, p = .01$) for the Satisfaction With One’s Own Performance as a Caregiver subscale. There were no significant treatment effects on slopes for separate subscales or the dysfunction (NPO, ICS, AS) and constructive dimensions (PPO, RPS) on the SPSI–R:S.

For depression, there were no significant interaction effects for any potential moderator. For caregiver competence, only caregiver age had a significant interaction with treatment. The interaction of caregiver age with treatment was significantly associated with the linear slope ($B = -0.17, SE = 0.06, t = -3.07, p = .002$) and quadratic slope ($B = 0.01, SE = 0.004, t = 2.76, p = .006$) on caregiver sense of competence. The gains in competence for the PSI group were best among the youngest participants (< 57 years of age; below $M – 1 SD$) and somewhat less for participants of typical sample age (57–73 years of age; within $M ± 1 SD$). No gains were apparent for the oldest participants (> 73 years of age; above $M + 1 SD$).

### Table 4

Estimates of Latent Growth Models of Caregiver Outcome Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Variance</th>
<th>SE</th>
<th>t</th>
<th>$\chi^2$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive symptoms (CES–D)</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>21.09</td>
<td>1.26</td>
<td></td>
<td></td>
<td></td>
<td>16.74**</td>
<td>.99</td>
<td>.068</td>
<td>.054</td>
</tr>
<tr>
<td>Intercept on treatment</td>
<td>–0.28</td>
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<td></td>
<td></td>
<td></td>
<td>–0.17</td>
<td></td>
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</tr>
<tr>
<td>Linear on treatment</td>
<td>–1.27</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
<td>–2.26*</td>
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<tr>
<td>Quadratic on treatment</td>
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<td>0.04</td>
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<td></td>
<td>2.17**</td>
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<td>Sense of competence (SCQ)</td>
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<tr>
<td>Intercept</td>
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<td>Linear on treatment</td>
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<td>2.28*</td>
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<td>Problem-solving (SPSI–R:S)</td>
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<tr>
<td>Intercept</td>
<td>65.45</td>
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<td>.064</td>
<td>.095</td>
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<td>–0.10</td>
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<td>Linear on treatment</td>
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<td>–1.63</td>
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<td>Physical complaints (GBB–24)</td>
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<td>Intercept</td>
<td>21.56</td>
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<td>13.01**</td>
<td>.98</td>
<td>.099</td>
<td>.056</td>
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<tr>
<td>Intercept on treatment</td>
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<td>2.37</td>
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<td>0.22</td>
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<tr>
<td>Linear on treatment</td>
<td>–1.73</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
<td>–2.45*</td>
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<td>Quadratic on treatment</td>
<td>0.11</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td>2.02*</td>
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<tr>
<td>Leisure time satisfaction (LTS)</td>
<td>1.88</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td>7.17**</td>
<td></td>
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<td>Intercept</td>
<td>5.32</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td>11.88**</td>
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<tr>
<td>Intercept on treatment</td>
<td>–0.26</td>
<td>0.62</td>
<td></td>
<td></td>
<td></td>
<td>–0.41</td>
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<tr>
<td>Linear on treatment</td>
<td>0.76</td>
<td>0.27</td>
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<td></td>
<td></td>
<td>2.87**</td>
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<tr>
<td>Quadratic on treatment</td>
<td>–0.06</td>
<td>0.02</td>
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<td></td>
<td></td>
<td>–2.89*</td>
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</table>

Note. Degrees of freedom for the $\chi^2$ tests = 2 for all tests; all $\chi^2$ tests were nonsignificant at $\alpha = .05$. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; Variance = variance of intercepts; CES–D = Center for Epidemiologic Studies–Depression Scale; Intercept on treatment = regression of latent intercept on treatment; Linear on treatment = regression of latent linear slope on treatment; Quadratic on treatment = regression of latent quadratic slope on treatment; SCQ = Sense of Competence Questionnaire; SPSI–R:S = Social Problem-Solving Inventory–Revised: Short Version; GBB–24 = Giessen Subjective Complaints List; LTS = Leisure Time Satisfaction.

*p < .05. **p < .01.
Effects on Care Recipient Depression and Functioning

Because problem-solving training for caregivers has evidenced beneficial effects on care recipients’ distress (Berry, Elliott, Grant, Edwards, & Fine, 2012) and social functioning (Elliott et al., 2008), we examined the possible effects of PSI on care recipient depression and functional impairment over time. The ANCOVAs for the pooled multiple imputation data showed no significant effects of PSI on the depressive symptoms (MADRS), ADLs (BI), and higher cognitive functioning (EBI) of care recipients after 12 months. There were also no significant treatment group differences in growth trajectories for BI and EBI that were assessed at all three time points.

Analysis of Participant Dropouts

Eight participants in the PSI group and 13 participants in the control group were not available for assessment after 12 months (see Figure 1). Death of the care recipient was the major cause for this attrition (n = 11). Compared with those who completed the protocol, the 21 dropouts showed a more avoidant problem-solving style, \( t(120) = -2.97, p = .004 \), and lower care recipient ADLs, \( t(120) = -4.04, p < .001 \), at baseline. All three relocations into long-term care occurred in the control group.

Discussion

Caregivers who received the PSI reported significant decreases in depressive symptoms and physical complaints and significant increases in their leisure time satisfaction, with small to medium effect sizes after 3 months (\( d_s = .43–.49 \)). The average number of burdensome areas, assessed with the card-sort procedure, decreased from 9.4 to 6.4, \( t = 4.01, p < .01 \), in the intervention group during the first 3 months. Analyzing the frequently mentioned burdensome areas (> 30% of caregivers) that were addressed in PSI, we observed the greatest reductions in perceived burden in ratings of poor health (\( p < .01 \)), being tied to the care recipient (\( p = .01 \)), exhaustion (\( p = .01 \)), worrying about the care recipient’s suffering (\( p = .06 \)), and sleep disturbances (\( p = .09 \); Beische, Hautzinger, Becker, & Pfeiffer, 2012).

The effects on outcomes were apparent over the year of participation, but the rate of decline in depression and the corresponding rate in the increase in leisure time satisfaction were most pronounced during the first 3 months of relatively intense and frequent training. Gains in confidence were best for younger caregivers and not apparent for the oldest participants. During this final segment, however, the control group participants reported steady decreases in distress and similar improvements in leisure satisfaction and confidence.

Collectively, these findings reflect the complex changes experienced by stroke caregivers over time (Gaugler, 2010) and suggest that the beneficial effects of problem-solving training may be realized in frequent sessions over the first 3 months of participation (Grant et al., 2002). These effects appear to be effective not only for caregivers in the implementation period following discharge from stroke rehabilitation (Grant et al., 2002) but also during a later time when adapting to the persistent demands of the caregiver role.

To our knowledge, this is the first study to report that problem-solving training may facilitate greater satisfaction in leisure time pursuits. Restrictions in social and recreational activities are associated with increased risk of depression among medical patients and their family members (Mausbach et al., 2011). PSI provided to family caregivers of individuals with recent-onset spinal cord injuries was associated with increases in caregiver social functioning over the year (Elliott & Berry, 2009). Participation in personal, social, and recreational activities may provide caregivers opportunities for positive emotional experiences that are typically absent in most caregiving scenarios. The increased sense of satisfaction in leisure pursuits indicates that resuming desired social and recreational activities may be an integral part of caregiver well-being in a manner consistent with the International Classification of Functioning, Disability, and Health (ICF) model of adjustment (World Health Organization, 2011).

Unfortunately, the beneficial effects of PSI cannot be attributed to significant gains in self-reported problem-solving abilities. Previous work on PSI with caregivers found null effects (Elliott et al., 2008) on problem-solving abilities despite significant decreases in caregiver depression. The mechanisms for the beneficial effects of PSI are not readily apparent under these circumstances. The discrepancy between the high prevalence of depressive symptoms, the relatively average scores on the measure of problem-solving abilities (according to U.S. norms), and the modest correlation be-
that are not modifiable or controllable.

dressed in future research, as caregivers often encounter problems goal-related activities on problem-solving coping could be ad-
tant and less successful (Beische et al., 2012). The influence of emotion-focused or meaning-focused coping goals was less fre-

during the first 3 months of intervention occurred while partici-
cations on communication with care recipient due to aphasia or cognitive impairment). Consequently, the most positive changes of another stroke, change of their own life plans, or lasting restric-

likely to work on unchangeable or uncontrollable issues (e.g., fear of another stroke, change of their own life plans, or lasting restric-

Another possible explanation is that the intensity of the problem orientation training as an essential condition for successful problem-solving intervention (Bell & D’Zurilla, 2009) was too low in our intervention.

From a training point of view, the intervention probably would have been more effective in regard to problem-solving abilities if we had introduced and trained all problem-solving steps in a more general psycho-educational way over several contacts first. On the other hand, in our opinion it was beneficial to address the caregivers’ problems and goals already in the first session for a better adherence as well as for future implementation of our intervention protocol into present formal services of the German statutory nursing care insurances.

Participants valued the telephone-based delivery of the intervention. Possible advantages were the flexibility in case of any unforeseen incidents, no need for additional efforts to be a good host for the assessor, greater ease in talking openly about their own issues when the care recipient was around, and the ability to stay at home without making arrangements for someone to be with the care recipient. Almost all participants believed it was important to have at least one personal face-to-face contact at the beginning of the intervention.

The use of telephone and other long-distance technologies for counseling circumvents obstacles that impede caregiver access to services such as time constraints and geographical isolation. Home-based telephone partnerships are rated highly by clients for their helpfulness, convenience, and the sense of control over sessions they provide (Reese, Conoley, & Brossart, 2006).

When analyzing the problems that were identified during the intervention, we could see that caregivers chose and worked mostly on daily problems that were potentially changeable (e.g., time issues, sleep, aggressive interactions), but they were less likely to work on unchangeable or uncontrollable issues (e.g., fear of another stroke, change of their own life plans, or lasting restrictions on communication with care recipient due to aphasia or cognitive impairment). Consequently, the most positive changes during the first 3 months of intervention occurred while participants were working on problem-focused goals. The uptake of emotion-focused or meaning-focused coping goals was less frequent and less successful (Beische et al., 2012). The influence of goal-related activities on problem-solving coping could be addressed in future research, as caregivers often encounter problems that are not modifiable or controllable.

Although all scales used in the study had adequate psychometric standards and have been widely used in clinical research, the absence of more behaviorally based outcome measures limits our understanding of the impact of the PSI. Despite the cognitive screening procedures, some older caregivers had difficulties in understanding and answering some questions on the SPSI-R:S. This may be due to the relatively complex wording with nested questions in the German translation (which was validated only with a group of students; Graf, 2003). This could have adversely influenced our results. Furthermore outcomes in social problem-solving could only be compared with U.S. norms (D’Zurilla et al., 2002) due to the lack of German norms for older people. The available means of total and subscale scores of the German SPSI-R:S were congruent to data of a comparable sample of students from the United States (Graf, 2003). The U.S. norms used for middle-aged and older adults were derived from a cultural homogeneous sample that was primarily White (98% and 93%, respectively). Despite these similarities, the interpretation of our SPSI-R:S data must be viewed with caution. Our assessment of care recipient depression was compromised in some cases by participant aphasia or cognitive impairment.

It is possible that caregivers in the control condition could have obtained additional outside treatment, support, or counseling during the 12 months. Alternatively, the information-only control condition, in tandem with services provided as part of their health and nursing insurance plans, may have been superior to an attention-only control group experience often used in caregiver intervention research. Bona fide treatment alternatives such as psychosocial programs that offer potential and unique benefits to participants are recommended in problem-solving intervention research (Malouff et al., 2007). Caregivers in the control condition experienced some important gains over time, although the PSI group was associated with more pronounced changes over the first 3 months.

Variance in the frequency of contacts and total intervention time could have resulted from our recruitment strategy that was predominantly based on addresses of former patients. This approach probably facilitated the screening of a more representative sample of participants than any recruitment procedure (e.g., through advertising) that would have required an active response by caregivers. The inclusion of caregivers in poor health and low capacity required an adjustment of treatment intensity. The same applied to depressed caregivers who had difficulties communicating with others because of their persistent social isolation or those participants with very low initial motivation. Differences in total intervention time were due to the restricted capacity of the caregiver, differences in the total initial number of burdensome problem areas (range 0–29; M = 9.4), the different total number of problems (1–19) that had been(addressed with structured problem-solving during the first 3 months of the intervention, and gender-specific issues.

It is important to note that the majority of the participants (n = 81, 66.4%) belonged to the cohort of wartime children who were 18 years old or younger at the end of World War II. Consequently, these individuals may possess unique characteristics because of their experiences during the war and in the postwar years. Prevalent behaviors observed for this aging cohort include lack of self-care, skepticism, security seeking, proper functioning, being money conscious, and avoiding dependency on people, devices or
situations (Radebold, 2011, pp. 70 –73). The degree to which these subjective and collective experiences impacted participants’ problem orientation in our intervention remains unclear and warrants attention in future research with individuals from this cohort.

The sample consisted of individuals who agreed to participate in a home-based intervention. The possibility of a motivation bias is characteristic of caregiver intervention research, generally. Randomization provides some degree of control over the possible effects of volunteer biases. Nevertheless, the sampling procedure, inclusion criteria, and lack of information about the caregivers who refused to participate limit the generalizability of the study. As in other psychosocial trials, blinding of the assessors was questionable because participants could reveal information (e.g., problem solving, card-sorting task, work sheets, intervention manual, telephone contacts) that allowed assessors to easily identify the treatment condition.

In general, the present study supports the potential usefulness of tailored cognitive behavioral therapy delivered in telephone sessions to individual caregivers of persons with a variety of chronic disabilities (Berry et al., 2012; Elliott et al., 2008; Grant et al., 2002; Rivera et al., 2008). However, the lack of effects on caregiver problem-solving abilities raises issues about the precise mechanisms through which benefits may occur. Although lacking in specificity, our findings illustrate the benefits caregivers may experience from frequent, therapeutic, and guided cognitive behavioral interventions.

References
Beische, D., Hautzinger, M., Becker, C., & Pfeiffer, K. (2012). Der tailored cognitive behavioral therapy delivered in telephone contacts (that allowed assessors to easily identify the treatment condition).

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References


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