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Relationship Consensus and Caregiver Burden in Adults with Cognitive Impairments 6 Months Following Stroke

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Abstract

Background: Caregiver burden is commonly experienced in caregivers of adults with cognitive impairments after stroke. This burden can be associated with caregiver-centered factors, including caregiver-perceived relationship quality.

Objective: To examine the role of caregiver-perceived relationship quality on caregiver burden at 6 months following stroke.

Design: Prospective data collection on caregivers of adults with stroke.

Setting: Community-settings.

Participants: Adults enrolled in two randomized controlled trials after stroke (n=60) and their caregivers (n=60).

Methods: Three constructs of relationship quality (relationship consensus, cohesion, and satisfaction) were examined as predictors of caregiver burden (the Abbreviated Dyadic Adjustment Scale). A hierarchical logistic regression and a Poisson regression with robust standard errors were used to examine the effect of relationship quality on caregiver burden while controlling for characteristics of stroke survivors and caregivers.

Main Outcome Measurements: Caregiver burden was measured with the Abridged Version of Zarit Burden Interview.

Results: Poor relationship consensus (OR=1.48; 95%CI=1.06–2.07; p=.02) increased odds of high caregiver burden after controlling for characteristics of stroke survivors (age, comorbidity, cognitive fluency) and caregivers (gender, self-reported health). Relationship cohesion (OR =1.03;

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95%CI=.84–1.25; $p=.81$) and relationship satisfaction (OR =1.53; 95%CI=.75–3.10; $p=.24$) did not predict caregiver burden.

Conclusion: Meaningful and agreeable goals and expectations between dyads are essential to reduce caregiver burden post stroke. A collaborative goal-setting between stroke survivors and their caregivers may be a promising intervention strategy to increase relationship consensus and reduce caregiver burden.

Introduction

Stroke is a prevalent and disabling condition that often requires informal caregiving. Informal caregiving is the act of aiding family members or loved ones who have disabilities. Taking care of adults with cognitive impairments after stroke can be especially burdensome, because the newly acquired physical and cognitive impairments often compromise daily activities [1,2]. Adults with stroke-related physical impairments may require assistance in physically challenging activities (e.g., dressing and bathing) while adults with stroke-related cognitive deficits may require help in cognitively challenging tasks (e.g., preparing meals or managing medications) [1,3]. Cognitive impairments may also influence judgment and problem-solving in day-to-day activities, making caregivers worry about stroke survivors' safety or the ability to perform daily tasks independently [4–6]. Caregivers often perceive burden due to the complexity of caring for someone with physical and cognitive impairments [1]. This caregiver burden negatively influences the caregiver's health, leading to poor social functioning, higher cardiovascular risk, and 63% higher mortality rates compared to the absence of burden [7,8].

Identifying factors associated with caregiver burden may inform intervention strategies to reduce caregiver burden and burden-related adverse consequences. In the caregiver stress model proposed by Pearson and colleagues [9], caregiver burden may exist due to objective and subjective stressors. Objective stressors are care-recipient (e.g., stroke severity, cognitive impairments, function) and caregiver characteristics (e.g., gender, self-reported health). Subjective stressors are the problems and hardships that follow the demands of caregiving (e.g., relationship conflicts). Tooth and colleagues showed that cognitive impairment was associated with caregiver burden in the first 12 months following stroke [1]. Reimer and colleagues suggested that stroke survivors' characteristics were associated with caregiver burden [3,5]. While some studies have focused on objective stressors, little research has investigated subjective stressors, especially caregiver-centered stressors after stroke [10].

After stroke, one-third of caregivers reported changes in their relationships [10,11]. New roles and emotional disturbances following stroke between members of the dyad may alter caregiver-perceived relationship quality [12,13]. Relationship quality has been defined via 1) consensus: the dyadic agreement of goals and expectations, 2) cohesion: the time and frequency that dyads spend together, and 3) satisfaction: the global happiness of a relationship [14,15]. These three constructs inform the qualitative and quantitative of relationship quality. Poulin and colleagues suggested that different caregivers perceived different relationship quality under similar life situations, such as providing the same amount of care or having similar employment status [16]. This suggests that caregiver-

perceived relationship quality may be independently associated with caregiver burden despite being classified as objective stressors and life situations. Surprisingly, the role of relationship quality on burden is rarely examined in the stroke population [10], compared to individuals with dementia, cancer, or children with disabilities [14,15]. In the areas of dementia and cancer, caregiver-perceived relationship quality has been a critical element to guide caregiver interventions in reducing burden [17,18]. Thus, understanding the association between relationship quality and caregiver burden is critical, because relationship quality may be a modifiable factor to reduce caregiver burden and improve stroke survivor's quality of life even with the presence of physical and cognitive impairments.

In this study, we examined whether relationship quality was associated with caregiver burden while controlling for known covariates that were associated with caregiver burden. The covariates included the characteristics of caregivers (e.g., gender, self-reported health) and care-recipients (e.g., stroke severity, cognitive impairments, function) that have been previously associated with caregiver burden [3,6,9,19]. We hypothesized that poor relationship consensus, cohesion, and satisfaction were associated with a higher burden in caregivers of stroke survivors.

Methods

Subjects

We interviewed caregivers of adults with cognitive impairments following a stroke at the University of Pittsburgh, Pittsburgh from 2012 to 2016. Caregivers were identified by either stroke survivors or caregivers themselves. There were no pre-existing eligibility criteria for a caregiver participating in the study. Every caregiver was asked if they were interested in participating in a 20–25 minute phone interview 6 months after their loved ones acquired stroke. Adults with cognitive impairments after stroke were participants in randomized clinical trials that examined the effects of meta-cognitive strategy training interventions on disability (R01 HD074693; R03 HD073770). The presence of cognitive impairments was defined as a total score of ≥ 3 on the Executive Interview (Quick-EXIT) [20]. The Quick-EXIT is a clinician-rated structured interview that measures cognitive executive function. The Quick-EXIT has 14 items that are scored on either 2 or 3-point ordinal scale (0 = no cognitive impairments, 3 = severe cognitive impairments). Item scores are summed and ranged from 0 to 28, with a total score of ≥ 3 indicating the presence of cognitive impairments [20]. Both dyad participants provided informed consent.

Measurements

Primary outcome –Caregiver burden—The Abridged Version of Zarit Burden Interview (ZBI) is a self-reported questionnaire that measures the level of caregiver burden [21]. The ZBI has 12 items that are scored on a 6-point ordinal scale, indicating the frequency of perceived burden (0 = rare, 5 = always). Item scores are summed and ranged from 0 to 48, with a total score of ≥ 12 indicating clinically meaningful caregiver burden [22]. The ZBI has shown good validity, internal consistency, and discriminative ability.

Relationship quality—The Abbreviated Dyadic Adjustment Scale (DAS-7) is a self-reported questionnaire that examines relationship quality. The DAS-7 has 3 dimensions: relationship consensus, relationship cohesion, and relationship satisfaction. Relationship consensus has 3 items that are scored on a 6-point ordinal scale, indicating the agreement on 1) philosophy of life, 2) goals and expectations that are important to both caregivers and care-recipients, and 3) the quality of time spent together (0 = always disagree, 5 = always agree). Item scores are summed and ranged from 0 to 15, with a higher score representing higher relationship consensus. Relationship cohesion has 3 items that are scored on a 6-point ordinal scale, indicating the frequency in which caregivers and care-recipients 1) exchange ideas, 2) discuss things, and 3) work on projects together (0 = never, 5 = more often). Item scores are summed and ranged from 0 to 15, with a higher score representing higher relationship cohesion. Relationship satisfaction has one item that is scored on a 7-point ordinal scale, indicating the global happiness with a relationship (0 = extremely unhappy, 6 = perfect). A higher score represents more happiness with a relationship. The DAS-7 has high discriminative validity, demonstrating the ability to differentiate between people who perceive distressed and non-distressed relationships [14].

Characteristics of caregivers—The caregiver's age, gender, race, ethnicity, years of education, relationship to care-recipient, residential status, and self-reported health were collected via interviews. Self-reported health was assessed via one item "In general, would you say that your health is..." and rated on a 5-point ordinal scale (0 = excellent, 4 = poor). A higher score represents the worst caregiver-perceived health.

Characteristics of care-recipients—The care-recipient's age, gender, race, ethnicity, years of education, and types of stroke (right/ left; ischemic/ hemorrhagic; cortical/ sub-cortical) were collected via medical chart review upon the stroke survivor's admission to inpatient rehabilitation. The National Institutes of Health Stroke Scale (NIHSS) was used to assess the severity of stroke [23]. The NIHSS has 15 items. Item scores are summed and range from 0 to 42, with a higher score indicating higher stroke severity. The Functional Independence Measure (FIM) was used to assess independence in daily activities [24]. The FIM has 18 items that are scored on a 7-point ordinal scale (1 = total assistance, 7 = complete independence). Item scores are summed and range from 18 to 126, with a higher score representing greater independence. The Patient Health Questionnaire-9 (PHQ-9) was used to assess the frequency of depressive symptoms. The PHQ-9 has 9 items that are scored on a 4-point ordinal scale (0 = not at all, 3 = nearly every day) [25,26]. Item scores are summed and ranged from 0 to 27, with a higher score representing greater depressive symptoms. The Charlson Comorbidity Index (CCI) was used to measure 19 categories of comorbidity [27,28]. Each category was weighted from 1 to 6 based on the risk of mortality. Item scores are summed and ranged from 0 to 35, with a higher score representing greater comorbidity severity. The Delis-Kaplan Executive Function System (D-KEFS) has age and education adjusted scaled scores that were used to assess cognitive fluency [29]. Cognitive fluency scaled score has a mean of 10 and a standard deviation of 3, with scores less than 7 indicating impairments in cognitive fluency. The NIHSS, FIM, PHQ-9, CCI, and D-KEFS were assessed in the inpatient rehabilitation 6-month follow-up prior to the caregiver interview.

Data analyses—The Statistical Package for the Social Sciences (SPSS, v. 24) was used for all data analyses [30]. The assumptions of a linear regression model were not met, thus, a hierarchical logistic regression was used to examine the association between relationship quality (3 dimensions) and caregiver burden while controlling for caregivers' and care-recipients' characteristics. To conduct a hierarchical logistic regression, caregiver burden was separated into two groups (dependent variable: high caregiver burden (ZBI ≥ 12 points) and low caregiver burden (ZBI < 12 points) based on the criteria from previous caregiving research [22]. Since the incidence of the outcome (caregiver burden) is commonly experienced, adjusted risk ratios derived from a Poisson regression with robust standard errors were also calculated [31]. Spearman's correlations were used to examine the correlations among caregiver burden, caregivers' and care-recipients' characteristics, and treatment assignment (allocated to either intervention or control groups) to identify potential covariates. A prior benchmark of at least small to moderate correlation of Spearman's correlation ≥ .20 was set for inclusion of covariates in the model. Group differences in demographic variables were also examined by *t* and χ^2 statistics to identify potential covariates included in the model. Four model-fit indices (Cox & Snell R square, Nagelkerke R square, the -2 likelihood ratio, and likelihood ratio χ^2) were used to examine whether the final model (relationship quality variables + covariates) indicated a better fitting model over the model with intercept only. Missing data were excluded from the analyses.

Results

A total of 280 caregivers were approached; 65 caregivers agreed to participate in the phone interview. We excluded 5 dyads who had missing values. A total of 60 dyads were included in the analyses. Table 1 describes the characteristics of caregivers (n=60) and care-recipients (n=60). The majority of care-recipients had an ischemic stroke (73%), but the regions affected by a stroke were equally distributed (47% of the cortical region; 53% of the right hemisphere). Caregivers tended to be spouses (58.3%) or children (23.3%) of the care-recipients and lived with care-recipients (73.3%).

Predictors of Caregiver Burden

Five covariates had small to moderate correlations with caregiver burden and were included in the model: care-recipients (CR)' age, comorbidity, and cognitive fluency, as well as caregivers (CG)' gender and self-reported health (Table 2). There was a statistically significant group difference on care-recipients' age.

After controlling for the five covariates (CR' age, comorbidity, cognitive fluency and CG' gender, self-reported health), only relationship consensus was statistically significant in its relationship with caregiver burden (OR=1.48; 95%CI=1.06–2.07; p=.02) (Table 3). There was no statistically significant association between caregiver burden with relationship cohesion (OR =1.03; 95%CI=.84–1.25; p=.81) or relationship satisfaction (OR =1.53; 95%CI=.75–3.10; p=.24). The adjusted risk ratios showed that relationship consensus and relationship satisfaction were significantly associated with caregiver burden (Adjusted RR=1.19; 95%CI=1.03–1.38; p=.02; Adjusted RR=1.31; 95%CI=1.04–1.65; p=.02), but not relationship cohesion (Adjusted RR=1.06; 95%CI=.98–1.14; p=.12).

Discussion

In this study, we examined the association between relationship quality and caregiver burden in caregivers of adults with cognitive impairments after stroke. Results showed that lower relationship consensus was associated with higher caregiver burden while controlling for caregiver and care-recipients' characteristics. For every one point reduction in relationship consensus, there was a 48% greater odds (or, a 19% higher risk) of experiencing high caregiver burden. This finding suggests that relationship consensus is an important factor to consider in caregiver burden. An enhancement of relationship consensus and satisfaction may potentially reduce burden and risk of adverse health outcomes in caregivers.

Dyads may experience poor relationship consensus when they confront life-changing events, such as the onset of stroke [32]. This poor relationship consensus may be explained by the equity theory [33]. The equity theory posits that there is a balance between giving and receiving in every relationship. After stroke, caregivers and stroke survivors are more likely to experience an inequity because of the imbalance on care provision and receiving. For caregivers, providing care (e.g., shopping; bill management) for adults with cognitive impairments after stroke is a new role that caregivers are asked to do. However, stroke survivors may struggle with their dependence on others [34]. The imbalance between *give and take* is associated with increased caregiver burden [35–38]. Poor relationship consensus may also come from the disagreements on goals and expectations believed to be important after a stroke. Caregivers may expect loved ones to return to work instead of staying at home [12]. Care-recipients may want to improve their cognition and function before re-engaging in life. Often times, these disagreements were not resolved between dyads and resulted in caregiver burden [37].

Relationship consensus can be a protective factor when there are mutually-agreed goals after stroke. The consensus of goals and expectations that are important between caregivers and stroke survivors could be facilitated through therapeutic strategies. Rehabilitation professionals could facilitate the family-based goal-setting process via guiding discussions between caregivers and care-recipients [39]. A family-based goal-setting process is a promising strategy to reduce caregiver burden because it is designed to help dyads identify common goals, set plans, and work together to reduce barriers in daily activities. It also supports respectful relationships and adjusts expectations in the family [10,34]. Research showed that adults with cognitive impairments after stroke were able to engage in goal setting and guiding discussions with trained rehabilitation professionals [40,41]. Future studies that focus on the therapist-guided interventions for caregivers and stroke survivors would be a promising strategy to reduce or prevent caregiver burden.

In our findings, the frequency that dyads were together (relationship cohesion) was not associated with caregiver burden. This finding is distinct from other studies that suggested living together was a predictor of caregiver burden [42,43]. Indeed, the frequency that dyads were together could be viewed as either a stressor or a protective factor. This direction may depend on whether the tasks dyads have been working on are meaningful and agreeable to both caregivers and care-recipients [39,44,45]. Our finding also found that for every one-point reduction in relationship satisfaction, there was a 53% greater odds (or, a 31% higher

risk) of experiencing high caregiver burden. However, this result was not statistically reliable. In fact, research has shown that caregiver burden, and high relationship satisfaction could co-exist, and this linkage depends on caregiving situations [46]. Caregivers can sense happiness in their relationships, even though it is often mixed with the feelings of burden.

In our study, one out of two caregivers (51.7%) experienced high caregiver burden at 6 months following their loved ones' stroke. When considering 795,000 people in the United States have a stroke each year, and one-third of them acquire cognitive impairments [47,48], a significant number of caregivers are at-risk of burden. These caregivers may become the next ones to suffer poor health, cardiovascular diseases, or even risk of mortality if their burden is not well-managed [7,8]. Thus, future interventions in facilitating relationship consensus may be promising in reducing burden and associated adverse health outcomes for caregivers of adults with cognitive impairments after stroke.

We acknowledge limitations in this study. First, we only interviewed caregivers on their experiences about relationship quality. The perspectives from care-recipients were worth exploring to understand if there was a discrepancy within the dyads. Second, we did not have data on caregiver's mood and health status. Since more than half of the caregivers were spouses and were nearly sixty years old, it would be essential to examine how diverse relationships (e.g., spouses; parent-child; friends) may drive differences in responses. We were unable to do this with our relatively homogeneous sample. Third, we interviewed caregivers of adults with cognitive impairments at 6 months following stroke. This study was cross-sectional, as such, we cannot determine the causal relationship between caregiver burden and relationship quality. It would be worthwhile to understand whether caregiver burden was associated with relationship quality over time after stroke. Last, caregivers that did not agree to participate in the interview may experience higher burden than those who were enrolled in the study.

Our study has many strengths. First, we examined relationship quality by its multi-dimensions. This strategy helped identify the key elements in relationship quality that influence caregiver burden after stroke. Second, our findings uncovered that caregivers of adults with stroke are essential in the goal-setting process to potentially reduce burden in the long run. This paper is the first step in understanding the association between relationship quality and caregiver burden in the stroke population. The present study indicates that a comprehensive evaluation in terms of the relationship consensus between dyads post-stroke is warranted. Future studies may identify the proper timing and therapeutic strategies that are best to facilitate the goal-setting process between caregivers and adults with cognitive impairments following stroke. Caregiving can be one of the most prominent roles in caregivers' lives. Thus, having a purposeful and mutually agreed lifestyle is a promising factor to empower caregivers to support themselves and stroke survivors in the long run.

Conclusion

Caregiver-perceived relationship consensus was associated with caregiver burden post stroke. Collaborative goal-setting between stroke survivors and their caregivers may be a promising intervention strategy to increase relationship consensus and reduce caregiver

burden. The information derived from this study may potentially be the key to inform interventions that support the dyads in the long run.

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References

1. Tooth L, McKenna K, Barnett A, Prescott C, Murphy S. Caregiver burden, time spent caring and health status in the first 12 months following stroke. *Brain Inj* 2005;19:963–974. [PubMed: 16263639]
2. Chow SK, Wong FK, Poon CY. Coping and caring: Support for family caregivers of stroke survivors. *J Clin Nurs* 2007;16:133–143. [PubMed: 17584422]
3. Reimer WJMS op, de Haan RJ, Rijnders PT, Limburg M, van den Bos GAM The burden of caregiving in partners of long-term stroke survivors. *Stroke* 1998;29:1605–1611. [PubMed: 9707201]
4. Choi-Kwon S, Kim H-S, Kwon SU, Kim JS. Factors affecting the burden on caregivers of stroke survivors in South Korea. *Arch Phys Med Rehabil* 2005;86:1043–1048. [PubMed: 15895355]
5. van den Heuvel ET, Witte LP de, Schure LM, Sanderma R, Jong BM Risk factors for burn-out in caregivers of stroke patients, and possibilities for intervention. *Clin Rehabil* 2001;15:669–677. [PubMed: 11777097]
6. Draper P, Brocklehurst H. The impact of stroke on the well-being of the patient's spouse: An exploratory study. *J Clin Nurs* 2007;16:264–271. [PubMed: 17239061]
7. Schulz R, Beach SR. Caregiving as a risk factor for mortality: The caregiver health effects study. *JAMA* 1999;282:2215–2219. [PubMed: 10605972]
8. Lee S, Colditz GA, Berkman LF, Kawachi I. Caregiving and risk of coronary heart disease in U.S. women: A prospective study. *Am J Prev Med* 2003;24:113–119. [PubMed: 12568816]
9. Pearlin LI, Mullan JT, Semple SJ, Skaff MM. Caregiving and the stress process: An overview of concepts and their measures. *Gerontologist* 1990;30:583–594. [PubMed: 2276631]
10. McPherson CJ, Wilson KG, Chyurlia L, Leclerc C. The caregiving relationship and quality of life among partners of stroke survivors: A cross-sectional study. *Health Qual Life Outcomes* 2011;9:29. [PubMed: 21554723]
11. Young J, Murray J, Forster A. Review of longer-term problems after disabling stroke. *Rev Clin Gerontol* 2003;13:55–65.
12. Kitzmüller G, Asplund K, Häggström T. The long-term experience of family life after stroke. *J Neurosci Nurs* 2012;44:E1–E13.
13. Coombs U Spousal caregiving for stroke survivors. *J Neurosci Nurs* 2007;39:112–119. [PubMed: 17477226]
14. Sharpley CF, Rogers HJ. Preliminary validation of the abbreviated spanier dyadic adjustment scale: Some psychometric data regarding a screening test of marital adjustment. *Educ Psychol Meas* 1984;44:1045–1049.
15. Risdal D, Singer GHS. Marital adjustment in parents of children with disabilities: A historical review and meta-analysis. *Res Pract Pers with Sev Disabil* 2004;29:95–103.
16. Poulin MJ, Brown SL, Ubel PA, Smith DM, Jankovic A, Langa KM. Does a helping hand mean a heavy heart? Helping behavior and well-being among spouse caregivers. *Psychol Aging* 2010;25:108–117. [PubMed: 20230132]

17. Etters L, Goodall D, Harrison BE. Caregiver burden among dementia patient caregivers: A review of the literature. *J Am Acad Nurse Pract* 2008;20:423–428. [PubMed: 18786017]
18. Northouse LL, Katapodi MC, Song L, Zhang L, Mood DW. Interventions with family caregivers of cancer patients: Meta-analysis of randomized trials. *CA Cancer J Clin* 2010;60:317–339. [PubMed: 20709946]
19. Rigby H, Gubitz G, Phillips S. A systematic review of caregiver burden following stroke. *Int J Stroke* 2009;4:285–292. [PubMed: 19689757]
20. Larson EB, Heinemann AW. Rasch analysis of the executive interview (the EXIT-25) and introduction of an abridged version (the Quick EXIT). *Arch Phys Med Rehabil* 2010;91:389–394. [PubMed: 20298829]
21. Bedard M, Molloy DW, Squire L, Dubois S, Lever JA, O'Donnell M. The Zarit burden interview: A new short version and screening version. *Gerontologist* 2001;41:652–657. [PubMed: 11574710]
22. Higginson IJ, Gao W, Jackson D, Murray J, Harding R. Short-form Zarit caregiver burden interviews were valid in advanced conditions. *J Clin Epidemiol* 2010;63:535–542. [PubMed: 19836205]
23. Goldstein LB, Samsa GP. Reliability of the National Institutes of Health stroke scale. *Stroke* 1997;28:307–310. [PubMed: 9040680]
24. Keith R, Granger C, Hamilton B, Sherwin F. The functional independence measure: A new tool for rehabilitation. *Adv Clin Rehabil* 1987;1:6–18. [PubMed: 3503663]
25. Kroenke K, Spitzer RL. The PHQ-9: A new depression diagnostic and severity measure. *Psychiatr Ann* 2002;32:509–515.
26. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606–613. [PubMed: 11556941]
27. Bravo G, Dubois M-F, Hebert R, De Wals P, Messier L. A prospective evaluation of the Charlson comorbidity index for use in long-term care patients. *J Am Geriatr Soc* 2002;50:740–745. [PubMed: 11982678]
28. Charlson ME, Charlson RE, Peterson JC, Marinopoulos SS, Briggs WM, Hollenberg JP. The Charlson comorbidity index is adapted to predict costs of chronic disease in primary care patients. *J Clin Epidemiol* 2008;61:1234–1240. [PubMed: 18619805]
29. Delis DC, Kramer JH, Kaplan E, Holdnack J. Reliability and validity of the Delis-Kaplan executive function system: An update. *J Int Neuropsychol Soc* 2004;10:301–303. [PubMed: 15012851]
30. IBM Corp. IBM SPSS statistics for Windows. 2013.
31. Knol MJ, Le Cessie S, Algra A, Vandenbroucke JP, Groenwold RHH. Overestimation of risk ratios by odds ratios in trials and cohort studies: Alternatives to logistic regression. *CMAJ* 2012;184:895–899. [PubMed: 22158397]
32. Patterson J Integrating family resilience and family stress theory. *J Marriage Fam* 2002;64:349–360.
33. Walker A, Pratt C, Relations NO-F, 1992 undefined. Perceived reciprocity in family caregiving. *Fam Relat* 1992;82–85.
34. Scharlach A, Li W, Dalvi TB. Family conflict as a mediator of caregiver strain. *Fam Relat* 2006;55:625–635.
35. Koerner SS, Kenyon DB. Understanding “good days” and “bad days”: Emotional and physical reactivity among caregivers for elder relatives. *Fam Relat* 2007;56:1–11.
36. Williamson GM, Shaffer DR. Relationship quality and potentially harmful behaviors by spousal caregivers: How we were then, how we are now. *Psychol Aging* 2001;16:217–226. [PubMed: 11405310]
37. Lawrence RH, Tennstedt SL, Assmann SF. Quality of the caregiver–care recipient relationship: Does it offset negative consequences of caregiving for family caregivers? *Psychol Aging* 1998;13:150–158. [PubMed: 9533197]
38. Snyder JR. Impact of caregiver–receiver relationship quality on burden and satisfaction. *J Women Aging* 2000;12:147–167. [PubMed: 10986856]
39. Lyons KS, Zarit SH, Sayer AG, Whitlatch CJ. Caregiving as a dyadic process: Perspectives from caregiver and receiver. *Journals Gerontol Ser B* 2002;57:195–204.

40. Skidmore ER, Holm MB, Whyte EM, Dew MA, Dawson D, Becker JT. The feasibility of meta-cognitive strategy training in acute inpatient stroke rehabilitation: Case report. *Neuropsychol Rehabil* 2011;21:208–223. [PubMed: 21391121]
41. Skidmore ER, Dawson DR, Whyte EM, et al. Developing complex interventions: Lessons learned from a pilot study examining strategy training in acute stroke rehabilitation. *Clin Rehabil* 2014;28:378–387. [PubMed: 24113727]
42. Graven C, Sansonetti D, Moloczij N, Cadilhac D, Joubert L. Stroke survivor and carer perspectives of the concept of recovery: A qualitative study. *Disabil Rehabil* 2013;35:578–585. [PubMed: 22889405]
43. Fried TR, Bradley EH, O’Leary JR, Byers AL. Unmet desire for caregiver-patient communication and increased caregiver burden. *J Am Geriatr Soc* 2005;53:59–65. [PubMed: 15667377]
44. Burman ME. Family caregiver expectations and management of the stroke trajectory. *Rehabil Nurs* 2001;26:94–99. [PubMed: 12035695]
45. Neufeld A, Harrison MJ. Unfulfilled expectations and negative interactions: Nonsupport in the relationships of women caregivers. *J Adv Nurs* 2003;41:323–331. [PubMed: 12581097]
46. Andren S, Elmstahl S. Family caregivers’ subjective experiences of satisfaction in dementia care: Aspects of burden, subjective health and sense of coherence. *Scand J Caring Sci* 2005;19:157–168. [PubMed: 15877641]
47. Patel M, Coshall C, Rudd AG, Wolfe CDA. Natural history of cognitive impairment after stroke and factors associated with its recovery. *Clin Rehabil* 2003;17:158–166. [PubMed: 12625656]
48. Benjamin EJ, Blaha MJ, Chiuve SE, et al. Heart disease and stroke statistics-2017 update: A report from the American Heart Association. *Circulation* 2017;135:e146–e603. [PubMed: 28122885]

Table 1.

Caregivers and care-recipient characteristics

Characteristics	Total	High burden group	Low burden group	χ^2 statistic	p -value
Caregiver [n (%)]	60 (100)	31 (51.7)	29 (48.3)		
Age [mean (SD)]	59.18 (10.45)	57.74 (9.44)	60.72 (11.40)	$t_{58} = -1.11$	0.27
Female [n (%)]	40 (67)	18 (58.1)	22 (75.9)	$\chi^2_{(1)} = 2.14$	0.14
Race [n (%)]				$\chi^2_{(2)} = 5.49$	0.14
White	51 (85)	29 (93.5)	22 (75.9)		
Black	6 (10)	1 (3.2)	5 (17.2)		
Other race	3 (5)	1 (3.2)	2 (6.9)		
> 12 years of education [n (%)]	45 (75)	24 (77.4)	21 (72.4)	$\chi^2_{(1)} = 0.20$	0.66
Spouse (married) [n (%)]	35 (58.3)	16 (51.6)	19 (65.5)	$\chi^2_{(1)} = 0.23$	0.63
Living with care-recipient [n (%)]	44 (73.3)	23 (74.2)	21 (72.4)	$\chi^2_{(1)} = 0.02$	0.88
Care-recipient [n (%)]	60 (100)				
Age [mean (SD)]	65.87 (13.23)	69.29 (12.56)	62.21 (13.16)	$t_{58} = 2.13$	0.04*
Female [n (%)]	35 (58.3)	16 (51.6)	19 (65.5)	$\chi^2_{(1)} = 1.19$	0.28
Race [n (%)]				$\chi^2_{(2)} = 3.16$	0.37
White	50 (83.4)	28 (90.3)	22 (78.6)		
Black	8 (13.3)	3 (9.7)	5 (17.9)		
Other race	1 (1.7)	0 (0)	1 (3.6)		
> 12 years of education [n (%)]	35 (58.3)	16 (51.6)	19 (65.5)	$\chi^2_{(1)} = 1.19$	0.28
Subcortical stroke [n (%)]	32 (53)	16 (51.6)	16 (55.2)	$\chi^2_{(1)} = 0.09$	0.77
Right hemisphere stroke [n (%)]	32 (53)	19 (61.3)	13 (44.8)	$\chi^2_{(1)} = 1.01$	0.32
Ischemic stroke [n (%)]	44 (73)	24 (77.4)	20 (69.0)	$\chi^2_{(1)} = 0.55$	0.46
Stroke severity, NIHSS [mean (SD)]	6.51 (4.38)	5.83 (3.82)	7.21 (4.87)	$t_{57} = -1.21$	0.23
Comorbidity, CCI [mean (SD)]	2.43 (1.91)	2.74 (1.88)	2.10 (1.92)	$t_{58} = 1.30$	0.20
Function, FIM [mean (SD)]	73.38 (17.78)	74.26 (16.11)	72.45 (19.65)	$t_{58} = 0.39$	0.70
Cognitive fluency, DKEFS [mean (SD)]†	6.27 (3.37)	6.94 (3.75)	5.55 (2.81)	$t_{58} = 1.61$	0.11

Characteristics	Total	High burden group	Low burden group	<i>t</i> statistic or χ^2 statistic	<i>p</i> -value
Depressive symptoms, PHQ-9 [mean (SD)]	6.32 (4.01)	6.97 (4.50)	5.66 (3.38)	<i>t</i> ₅₇ = 1.26	0.21

* *p*-value <.05

Table 2.

Correlates of covariates for caregiver burden

	Care-recipient (CR) characteristics			Caregiver (CG) characteristics		
	1	2	3	4	5	6
1 Caregiver burden [†]	-					
2 Age (CR)	.20	-				
3 Comorbidity (CR) [†]	.25 [*]	.25 [*]	-			
4 Cognitive fluency (CR)	.20	.04	.08	-		
5 Gender (CG)	.22	.19	.15	.03	-	
6 Self-reported health (CG) [†]	.20	-.03	.13	.10	.11	-

[†] Higher scores indicate more caregiver burden, comorbidity, and worse self-reported health;

^{*} *p*-value < .05

Note: Caregiver burden was dichotomous into high (score 12 points) and low.

Table 3.

Odds ratios, risk ratios and model fit statistics

Caregiver burden											
Variables	OR	β	[95% CI]	p	Adjusted OR	β	[95% CI]	p	RR	β	[95% CI]
Age (CR)	.96	-.04	[.91–1.01]	.12					.99	-.01	[.97–1.01]
Comorbidity (CR)	1.02	.02	[.72–1.44]	.92					.98	-.02	[.83–1.16]
Cognitive fluency (CR)	.89	-.12	[.74–1.06]	.18					.94	-.06	[.87–1.02]
Gender (CG)	1.66	.51	[.50–5.55]	.41					.73	.31	[.36–1.50]
Self-reported health (CG)	.63	-.47	[.37–1.05]	.08					.84	-.18	[.68–1.03]
Relationship quality (CG)											
Consensus					1.48	.39	[1.06–2.07]	*.02	1.19	.18	[1.03–1.38]
Cohesion					1.03	.03	[.84–1.25]	.81	1.06	.06	[.98–1.14]
Satisfaction					1.53	.42	[.75–3.10]	.24	1.31	.27	[1.04–1.65]
Model fit statistics											
χ^2	11.40			*.04	24.04			*.01			
Cox & Snell R^2	.17				.33						
Nagelkerke R^2	.23				.44						
-2 Log Likelihood	71.72				59.08						
Classification (%)	65.0				78.3						
Likelihood ratio χ^2									5.40		
										.37	
									9.31		
											.16

Note: Caregiver (CG); Care-recipient (CR);

*
p-value < .05