

## Quality-of-life predictors for caregivers at 1 and 6 months poststroke: Results of path analyses

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**Abstract**—In this study, we used path analyses to test a theoretical model of influences on quality of life (QOL) for stroke caregivers at 1 and 6 months poststroke. We examined data from two points in time to determine the influence of stroke survivor and caregiver characteristics on QOL for stroke caregivers. Stroke survivor and caregiver characteristics had some direct influence on QOL outcomes for stroke caregivers at both 1 and 6 months poststroke. However, the most influential factor at both time points on each QOL component was sense of coherence (SOC). SOC is a relatively new factor in QOL and caregiver literature and is essentially the ability of caregivers to mobilize their coping resources during periods of stress. Caregivers who were able to mobilize these resources effectively experienced less burden in four QOL components and fewer symptoms of depression.

**Key words:** burden, caregivers, coping, depression, functional status, income, quality of life, race/ethnicity, sense of coherence, stroke.

### INTRODUCTION

Informal caregiving for individuals with chronic diseases and disabilities in the United States is quite expensive, with market values of caregiving ranging from \$117 to \$292 billion a year [1]. These costs are a result of the time and attention unpaid friends and family members give to individuals who require care. Informal caregiving

costs are not included when national healthcare costs are calculated. If they were, our national healthcare costs would increase by more than \$200 billion annually [1]. Further, the costs of informal caregiving at home are far greater than the costs of nursing home care (\$83 billion) or formal home healthcare (\$32 billion) [1]. Although the economic impact of caregiving is significant, the threats to caregiver quality of life (QOL) are even greater.

**Abbreviations:** AARP = American Association of Retired Persons; ANOVA = analysis of variance; FIM = Functional Independence Measure; GDS = Geriatric Depression Scale; ICD-9 = International Classification of Disease, 9th Revision; NAC = National Alliance for Caregiving; QOL = quality of life; SAS = Statistical Analysis Software; SCQ = Sense of Competence Questionnaire; SD = standard deviation; SOC = sense of coherence; VA = Department of Veterans Affairs.

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Stroke caregivers often experience threats to their QOL as a result of providing care. QOL is measured by examination of a variety of parameters. The most prevalent in caregiving literature include depression and components of burden [2]. Many personal and contextual factors influence the multidimensionality of QOL for caregivers, including race/ethnicity [3–4] and relation to stroke survivor [5–6]. Further, the functional status [7–8] and income of the stroke survivor [8–9] have been shown to influence the QOL of the caregiver.

Caring for the caregiver will maintain this important component of healthcare, informal caregiving. In addition to the financial benefits of informal caregiving to national healthcare costs, Clarke et al. found that at 3 months post-stroke, individuals who were receiving care at home experienced less physical impairment than those who were living in an institution [10]. Thus, caring for the caregivers will provide national healthcare benefits and be beneficial for the stroke survivor.

We performed this study to identify predictors of QOL in stroke caregivers longitudinally; i.e., at 1 and 6 months after an acute stroke survivor was discharged home. Findings from this study will provide information to managers and clinicians about the education, counseling, and therapeutic interventions that they need to prepare caregivers prior to care recipients' discharge. They will also provide information about the support needs of caregivers at 1 and 6 months poststroke.

## Background

In the United States, stroke is the foremost cause of disability and one of the leading causes of death [10]. The consequences of stroke are often swift and severe and leave little opportunity for informal caregivers to emotionally adjust to the new role for which they have either volunteered or are expected to fill. Informal caregiving is provided by family members or friends who provide more than normal or expected care, primarily in the home setting [11]. Informal caregiving typically requires substantial amounts of uncompensated time and energy for months or years and is physically, mentally, financially, and socially taxing. The number of informal caregivers nationwide is enormous and growing. For example, a national survey by the National Alliance for Caregiving/American Association of Retired Persons (NAC/AARP) found that the number of informal caregivers tripled between 1988 and 1996 [12]. Further, the most recent

NAC/AARP national survey of caregivers found 44.4 million informal caregivers in the United States [13]. Informal caregiving for stroke survivors is very prevalent in the United States, with 60 to 72 percent of stroke survivors discharged home to continue recovery [14].

The burgeoning literature in caregiving presents conflicting information regarding how and if stroke survivor and caregiver characteristics influence the caregiving experience. In this section, empirical evidence of influences on QOL for stroke caregivers will be examined.

## Stroke Survivor Characteristics

The characteristics of the stroke survivor may have an important influence on QOL outcomes for the caregiver [15]. Numerous studies have reported a connection between stroke outcome and the effect on caregiver psychosocial factors. For example, stroke survivors' functional status has been positively associated with role overload for caregivers [4,7]. A study of 1,570 caregivers of veterans found that functional status was the only variable that affected caregiver burden [8]. In contrast, however, several studies have found that caregiver burden was independent of the functional status of the stroke survivor [6,16–17].

Income may also be an important variable that can influence the caregiving relationship [9]. Hughes et al. found that low income was significantly correlated with diminished physical functioning of the care recipient, reduced emotional role and social function of the caregiver, and decreased mental and physical health of the caregiver [8]. Bakas and Burgener studied 104 family caregivers of stroke survivors in a cross-sectional study and found that poor health of the caregiver was predicted by low income [18]. Low income may also affect the ability of the caregiver to cope if resources are not available. Just as stroke survivor characteristics can affect the caregiving experience, so can characteristics of the caregiver.

## Caregiver Characteristics

A paucity of research exists on the relationship between race/ethnicity and caregiving, particularly for stroke caregivers; some evidence suggests that outcomes vary by race/ethnicity. For example, research on caregiving in Alzheimer's disease has shown that outcomes vary by race/ethnicity and similar differences may exist for stroke caregivers [2]. Hartke and King found that non-Caucasian caregivers found caregiving tasks more difficult than Caucasian caregivers, but Caucasian caregivers

identified their stroke survivor as having more problems [19]. The relationship between the stroke survivor and the caregiver changes as a consequence of the caregiving role, and these relationship changes may affect the level of burden experienced by the caregiver. For example, spousal caregivers experience more distress and depression than nonspousal caregivers [9,20]. The possibility exists, then, that caregiver characteristics (such as race/ethnicity and relation to stroke survivor) may influence the coping ability of the caregiver.

### Coping

Coping has been defined as the appraisal of demands that may exceed the person's means or be identified as challenging [21]. If stress is prolonged or insufficiently managed, it may result in a physical illness or disability. Physical consequences of stress are identified as having a pathogenic orientation. Traditional theories of stress tend to follow this orientation. However, a more recent change in perspective has occurred in stress literature. A salutogenic orientation examines the social factors which mediate the health effects of stress. One theory that uses the salutogenic orientation is the sense of coherence (SOC). The SOC has been defined as—

A global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement. [22].

The SOC concept really is "a global orientation" of coping [22]. So, the SOC is not a specific coping strategy but rather the mobilization of coping and adaptive resources that decrease the deleterious effects of stress. It is essentially how individuals appraise the stressful situation and choose to handle it. The SOC has three main components: comprehensibility (the course of the stressor is structured, predictable, and explicable), manageability (the individual has the necessary resources available to meet the demands), and meaningfulness (these demands are worthy of investment and engagement) [22].

When applied to caregivers, this concept can be used as an appraisal of caregivers' ability to mobilize resources to deal with a care recipient's illness. Thus,

individuals with a higher SOC have a greater likelihood of avoiding collapse in times of stress. In fact, caregivers who have a lower SOC have been found to be at higher risk of caregiving burnout and have increased difficulty coping with the caregiving situation [23]. Farran et al. found that caregivers who were able to manage competing stressors and expectations were able to cope more effectively [24]. These caregivers accepted their roles as comprehensible and viewed the caregiving experience as manageable and meaningful. Caregivers who have higher SOC levels are (1) less likely to perceive role overload, (2) more likely to redefine a stressful situation to make the experience meaningful, and (3) less likely to adopt dysfunctional coping mechanisms [7]. Caregivers who have more difficulty coping are likely to experience poorer QOL.

### Quality of Life for Caregiver

QOL is an important aspect of caregiving because QOL of the caregiver has implications for the care recipient. Frequently, caregiver QOL definitions include concepts of burden, satisfaction, role disruption, and depression [8–9]. Caregiver burden is caused by feelings of responsibility, uncertainty about the needs of the stroke survivor, decreased social interaction, and role as the sole provider of care [17]. Caregivers who report a higher degree of burden also report higher levels of demands, greater difficulty coping, and greater worry about the care recipient [19]. Caregivers who participate in more dependent care (e.g., toileting, bathing) experience greater emotional distress and burden [18,25]. Further, caregivers with higher levels of burden experience higher levels of depression [25].

Research on caregiving for stroke survivors has consistently reported higher rates of depression in the caregivers compared with noncaregiving control subjects [2,26–27]. Depression rates in stroke caregivers have been reported to be as high as 40 to 52 percent, particularly among spousal caregivers [28–30], and tend to persist across time [31]. Caregiver depression has been associated with less successful long-term outcomes for the stroke survivor [32]. Hartke and King found that caregivers who were depressed were more likely to have difficulty with caregiving, report more problems with the care recipient, experience financial concerns, and report a decrease in social involvement [3]. Depression appears to increase with the severity of the stroke [26–27].

## Summary

Previous studies have substantiated that caregiving threatens QOL for caregivers and, in turn, may influence the recovery of stroke survivors and their ability to sustain independent living in the home. A variety of factors have been shown to influence QOL for stroke caregivers. Studies provide evidence that individual characteristics of the stroke survivor (functional status, income) and caregiver (race/ethnicity, relation to stroke survivor) influence QOL of the caregiver. **Figure 1** is an empirically based conceptual model derived from the literature on caregiving that was tested in this study at 1 and 6 months poststroke. The model displays the expected relationships between the individual characteristics, the caregiving experience, and the QOL outcomes for the caregiver. Thus, the following hypotheses were tested in this study:

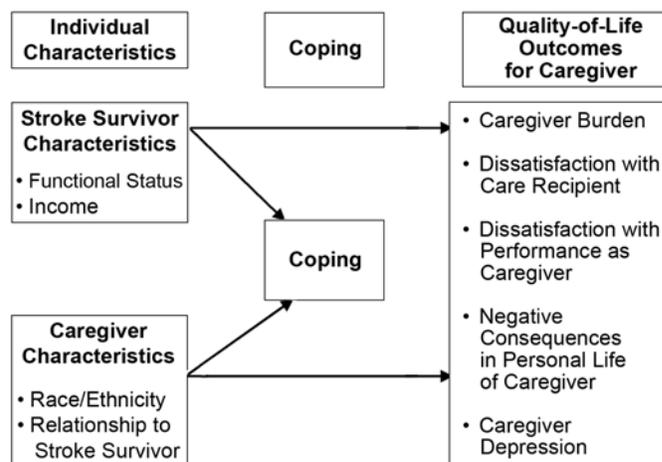
1. Stroke survivor characteristics influence the coping ability of the caregiver at 1 and 6 months poststroke.
2. Caregiver characteristics influence the coping ability of the caregiver at 1 and 6 months poststroke.
3. Coping ability of the caregiver will influence QOL outcomes for the caregiver at 1 and 6 months poststroke.
4. Stroke survivor characteristics directly influence QOL for caregivers at 1 and 6 months poststroke.
5. Caregiver characteristics directly influence QOL for caregivers at 1 and 6 months poststroke.

## METHODS

Data for this study were collected as part of a larger ongoing stroke recovery and caregiving study. The larger study, funded by the Department of Veterans Affairs (VA) Health Services Research and Development Service, is entitled "Culturally sensitive models of stroke recovery and caregiving after discharge home." The larger study is a multisite, longitudinal cohort study with 6 sites in Florida and Puerto Rico. This substudy examines the predictors of QOL for stroke caregivers at 1 and 6 months poststroke. The study was approved by the local institutional review boards.

## Procedures

At each site, a research coordinator met with the stroke survivor within 72 h of admission for the index stroke or when medically stable, explained the study, and enrolled the stroke survivor if he or she met the inclusion criteria and consented to participate. The coordinator



**Figure 1.**

Conceptual model of influences of individual characteristics on quality-of-life outcomes for stroke caregivers.

then met with the caregiver identified by the stroke survivor as the primary caregiver, explained the study, and enrolled the caregiver if he or she met the inclusion criteria and consented to participate. If the stroke survivors were not able to communicate verbally within 72 h of admission, the study coordinator checked with them daily until discharge to determine if their speech clarity had changed. If so, they were enrolled at that time if they consented to participate. Inclusion criteria for the study required that veterans (1) be one of the three ethnic groups, (2) be discharged directly home from an acute care unit following a stroke (International Classification of Disease, 9th Revision [ICD-9], Codes 430–438, except ICD-9 Code 435), (3) score 18 or higher on the Mini-Mental State Exam, (4) be able to verbally communicate at discharge, (5) have a caregiver willing to participate, and (6) sign a consent form or have the consent form signed by a proxy. For inclusion in the study, informal caregivers must have been (1) a spouse, significant other, family member, or involved friend who the stroke survivor identified as a primary caregiver; (2) able to communicate verbally; and (3) willing to participate and sign a consent form. Additional inclusion criteria for this substudy required that caregivers be Puerto Rican-Hispanic, African American, or Caucasian.

Stroke survivors and their caregivers were visited in their homes by a race/ethnicity-matched data collector at 1 and 6 months poststroke. At each visit, the stroke survivor and caregiver completed a battery of instruments that were designed to examine stroke recovery and the caregiving experience.

## Instrumentation

We used a multidimensional battery of psychometrically sound instruments designed to examine burden, depression, and SOC in this study. These instruments have all been used with stroke survivor and caregiver populations previously, and specifics regarding psychometric test references follow.

### *Stroke Survivor and Caregiver Characteristics*

Demographic data included age, employment status, and income level of the stroke survivor. Demographic data for the caregiver included race/ethnicity and employment status. These data were collected on demographic data collection forms.

### *Stroke Survivor Functional Status*

The Functional Independence Measure (FIM) is the most widely used method of assessing functional ability in persons with a disability. We used the FIM to measure severity of disability and functional outcomes over time. The FIM consists of 18 items that are graded on a 7-level ordinal scale [33–34]. The FIM has six subscales: self care, sphincter control, transfer capability, locomotion, communication, and social cognition. The reliability and validity of the FIM are well established [33–35].

### *Caregiver Coping*

The SOC questionnaire is a global measure of the ability of the caregiver to mobilize adaptive coping resources. The SOC is a 13-item self-report scale that has been used in over 20 countries [7,22]. It has demonstrated strong internal validity, reliability, and test-retest correlation [7,22].

### *Caregiver Depression*

Caregiver depression was assessed with the Geriatric Depression Scale (GDS). The GDS is a 30-item scale that has a dichotomous variable (yes or no) format. Reliability, internal consistency, test-retest validity, and concurrent validity have all been established for the GDS [36–38].

### *Caregiver Burden*

Caregiver burden was assessed with the Sense of Competence Questionnaire (SCQ). The SCQ was derived from the burden interview [39]. The SCQ consists of 27 items, with 3 subscales: dissatisfaction with the care recipient (7 items), dissatisfaction with one's own performance as a caregiver (12 items), and negative consequences of involvement in care for the personal life of the caregiver (8 items).

The questionnaire has a 4-point Likert-type response scale, and the burden score is determined by summation of the three scales. Higher scores indicate higher levels of burden. The composite burden scale and the three individual subscales have demonstrated strong validity and reliability [40].

## Analysis

The hypotheses that stroke survivor and caregiver characteristics influence the coping ability of the caregiver and that coping ability influences QOL for the caregiver were tested with path models at 1 and 6 months poststroke. Path analysis is a multivariate statistical technique in which we use a series of multiple and simple linear regression models to test the strength of causal relationships among variables [41]. We analyzed the data using Statistical Analysis Software (SAS) version 8.0 (SAS Institute, Cary, North Carolina). Prior to conducting the path analyses, we tested the colinearity of the data with the colinearity diagnostics in SAS. No data had a condition index of greater than 30, which suggests that multicollinearity was not a problem in this data set.

## RESULTS

### Participants

This study included 127 dyads of stroke survivors and their caregivers. Of these, 4 pairs were excluded because of a change in caregiver from 1 month to 6 months, 29 pairs were excluded because of missing data, and 2 pairs were excluded because of the caregiver not belonging to one of the three ethnic groups under study (Caucasian, African American, or Puerto Rican-Hispanic). Thus, a total 92 stroke survivors and their caregivers ( $N = 184$ ) were included in this study. Stroke survivor and caregiver demographics are summarized in **Table 1** and **Table 2**.

The stroke survivors experienced a variety of stroke types that were categorized with ICD-9 codes [42]. Most stroke survivors were classified as having an occlusion of cerebral arteries (ischemic stroke, 57.6%), with resulting residual paresis on the right side of the body (47.8%). At 1 month poststroke, the mean FIM motor score for the stroke survivors was  $79.73 \pm 15.0$  standard deviation (SD), and at 6 months, it was  $82.2 \pm 12.6$  SD. For most stroke survivors, annual income was less than \$15,000 (46.7%).

Most caregivers were spouses of the stroke survivors (68.5%) and their mean age was 60 yr. Our sample

**Table 1.**

Stroke survivor characteristics by percentage or mean  $\pm$  standard deviation (SD) ( $n = 92$ ).

Stroke Survivor Characteristics	<i>n</i>	Percentage or Mean $\pm$ SD
Age (yr)*	92	67.2 $\pm$ 10.2
Marital Status		
Married	65	70.7%
Divorced	17	18.5%
Never Married	3	3.3%
Widowed	5	5.4%
Separated	2	2.0%
Income (per year)		
<\$15,000	43	46.7%
\$15,001 to \$25,000	23	25.0%
\$25,001 to \$35,000	15	16.3%
\$35,001 to \$45,000	8	8.7%
>\$45,000	3	3.3%
Type of Stroke		
Ischemic	53	57.6%
Cerebrovascular Disease	35	38.0%
Hemorrhagic	4	4.4%
Impairment from Stroke		
Right Side	44	47.8%
Left Side	38	41.3%
Bilateral	3	3.3%
None	7	7.6%
FIM Motor Score <sup>†</sup> 1 Mo	92	79.7 $\pm$ 15.0
FIM Motor Score <sup>†</sup> 6 Mo	92	82.2 $\pm$ 12.6

\*Stroke survivors ranged in age from 46 to 83 yr.

<sup>†</sup>Functional Independence Measure (FIM) Motor Score range is 26 to 91.

included 42 Puerto Rican-Hispanic caregivers (45.7%), 35 Caucasian caregivers (38.0%), and 15 African-American caregivers (16.3%). Most caregivers were not employed full-time outside of the home at 1 (68.5%) or 6 months (67.4%). Caregivers reported that they provided care or stayed with the stroke survivor a mean of 8.1 h/d, with a range of 0 to 24 h/d.

### Multivariate Analysis Results

The multivariate analyses tested Hypotheses 1 through 5 and the relationships in the conceptual model (**Figure 1**). The first analysis examined the direct effects of stroke survivor and caregiver characteristics on coping and the direct effects of coping on QOL outcomes for calculation of composite indirect effects. Indirect effects included the effects of the stroke survivor and caregiver characteristics and the

**Table 2.**

Caregiver characteristics by percentage or mean  $\pm$  standard deviation (SD) ( $n = 92$ ).

Caregiver Characteristics	<i>n</i>	Percentage or Mean $\pm$ SD
Relationship to Stroke Survivor		
Spouse	63	68.5%
Other	12	13.0%
Friend	9	9.8%
Daughter	6	6.5%
Son	2	2.2%
Age (yr) *	92	60.1 $\pm$ 12.6
Sex		
Female	82	89.0%
Male	10	11.0%
Ethnicity		
Puerto Rican-Hispanic	42	45.7%
Caucasian	35	38.0%
African American	15	16.3%
Employment Status 1 Mo		
Full-Time	22	23.9%
Part-Time	7	7.6%
Not Outside of Home	63	68.5%
Employment Status 6 Mo		
Full-Time	20	21.7%
Part-Time	10	10.9%
Not Outside of Home	62	67.4%

\*Caregivers ranged in age from 23 to 86 yr.

intervening variable, coping, on QOL outcomes for the caregiver. The next analysis examined the direct effects of stroke survivor and caregiver characteristics on QOL outcome measures. We then added these direct effects to the indirect effects to determine the total effects. All direct and indirect effects are reported with the standardized beta coefficient ( $\beta$ ) so the strength of the coefficients can be compared with each other.  $\beta_1$  indicates data for 1 month poststroke and  $\beta_6$  data for 6 months poststroke.

Path analyses are composed of direct, indirect, and total effects. A direct effect indicates how an independent variable will affect a dependent variable when all other independent variables are controlled (William R. Intro to path analysis, <http://www.nd.edu/~rwilliam/xsoc593/lectures/l63.pdf>). It also indicates that a 1 SD change in the independent variable will affect the specified dependent variable. Path analyses do not supply the entire picture of what is occurring (just as correlations do not) and other mediating variables may exist that intervene. An

indirect effect is one that operates through an intervening variable [41]. To calculate the composite indirect effect, we multiplied the direct effect of the independent variable on the mediating variable by the direct effect of the mediating variable on the dependent variable.

To determine if a significant change occurred in outcome measures from 1 to 6 months and examine if the  $\beta$  coefficients differed significantly, we pooled the data to determine the time interaction of the coefficients. To do this, we used a two-way fixed-effects model (also known as a two-way repeated-measures analysis of variance [ANOVA]) with time as an interactive and additive factor.

#### Indirect Effects

To determine the indirect effects of stroke survivor and caregiver characteristics through the mediating variable of coping, we examined the direct effects of stroke survivor and caregiver characteristics on the coping ability of the caregiver. These analyses were followed by an examination of the direct effects of coping ability on QOL outcomes for the caregivers. We multiplied these direct effects to determine the indirect effects of stroke survivor and caregiver characteristics and the intervening variable, coping, on QOL outcomes for caregivers at 1 and 6 months poststroke. Hypotheses 1 and 2 examined the direct effects of stroke survivor and caregiver characteristics on the coping ability of the caregiver. When stroke survivor and caregiver characteristics were regressed on coping ability at 1 and 6 months, none of the characteristics were significantly associated with coping ability (**Table 3** and **Table 4**).

Hypothesis 3 examined direct effects of the coping abilities of the caregivers on their QOL outcomes (**Table 5**). The paths are depicted graphically in **Figure 2** for the 1 month data and **Figure 3** for the 6-month data. At 1 month poststroke, the overall burden level was significantly and inversely affected by the coping ability of the caregiver ( $\beta_1 = -0.45, p < 0.0001$ ), as was satisfaction with the care recipient ( $\beta_1 = -0.37, p = 0.0002$ ). That is, at 1 month poststroke, caregivers who coped better experienced less overall burden and less dissatisfaction with the care recipient. The caregivers' coping ability was significantly and inversely affected by their satisfaction with themselves as the provider of care at 1 month poststroke ( $\beta_1 = -0.47, p < 0.0001$ ). This finding indicates that in the first month of providing care, caregivers who coped better felt less dissatisfied with themselves as caregivers. Further, consequences in personal life as a result of providing care had an inverse and significant effect on

**Table 3.**

Direct effects (standardized  $\beta$  coefficient and  $p$ -value) of stroke survivor characteristics on caregiver coping abilities at 1 and 6 months poststroke.

Stroke Survivor Characteristics	$\beta$	$p$ -Value
Stroke Survivor Functional Status		
1 Mo	0.05	0.65
6 Mo	0.03	0.90
Income: \$15,000 to \$25,000		
1 Mo	-0.02	0.82
6 Mo	-0.07	0.54
Income: \$25,001 to \$45,000		
1 Mo	0.005	0.83
6 Mo	-0.10	0.40

**Table 4.**

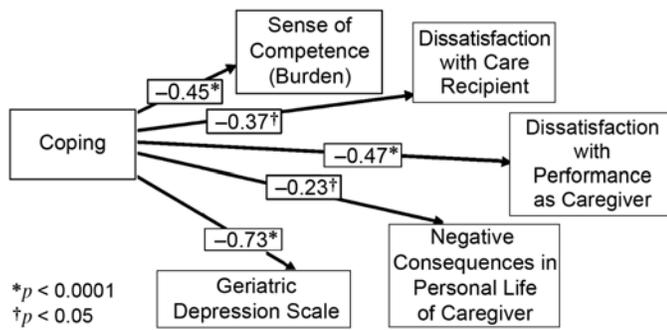
Direct effects (standardized  $\beta$  coefficient and  $p$ -value) of caregiver characteristics on caregiver coping abilities at 1 and 6 months poststroke.

Caregiver Characteristics	$\beta$	$p$ -Value
Ethnicity: Puerto Rican-Hispanic		
1 Mo	-0.02	0.87
6 Mo	-0.04	0.70
Ethnicity: African American		
1 Mo	-0.08	0.48
6 Mo	0.11	0.34
Relationship: Nonspouse		
1 Mo	0.01	0.91
6 Mo	0.15	0.16
Sex: Male		
1 Mo	-0.12	0.25
6 Mo	0.06	0.60

**Table 5.**

Direct effects (standardized  $\beta$  coefficient and  $p$ -value) of coping on quality-of-life outcomes for stroke caregivers at 1 and 6 months poststroke.

Outcome	$\beta$	$p$ -Value
Sense of Competence Questionnaire Composite		
1 Mo	-0.45	<0.0001
6 Mo	-0.47	<0.0001
Dissatisfaction with Care Recipient		
1 Mo	-0.37	<0.0002
6 Mo	-0.42	<0.0001
Dissatisfaction with Performance as Caregiver		
1 Mo	-0.47	<0.0001
6 Mo	-0.32	0.002
Negative Consequences in Personal Life of Caregiver		
1 Mo	-0.23	0.02
6 Mo	-0.44	<0.0001
Geriatric Depression Scale		
1 Mo	-0.73	<0.0001
6 Mo	-0.76	<0.0001

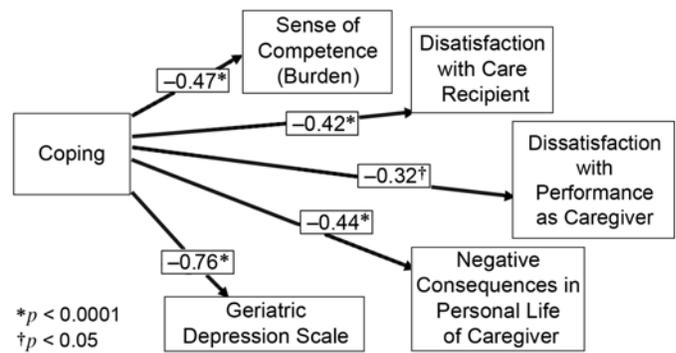


**Figure 2.**

Path depiction of effects of coping on quality-of-life outcomes for stroke caregivers at 1 month poststroke.

coping ability at 1 month ( $\beta_1 = -0.23$ ,  $p = 0.02$ ). That is, at 1 month, caregivers who coped better experienced significantly fewer negative consequences in their personal lives as a result of the caregiving experience. Finally, the ability to cope had an inverse and significant affect on the number of depressive symptoms experienced by the caregiver at 1 month ( $\beta_1 = 0.75$ ,  $p < 0.0001$ ), which indicates that caregivers who cope more effectively experience fewer depressive symptoms in the first month after stroke.

At 6 months poststroke, the overall burden level significantly and inversely influenced the coping ability of the caregiver ( $\beta_6 = -0.47$ ,  $p < 0.0001$ ) and the caregiver's satisfaction with the care recipient ( $\beta_6 = -0.42$ ,  $p < 0.0001$ ). That is, caregivers who coped more effectively felt less overall burden and less dissatisfaction with the care recipient. Coping ability of the caregiver significantly and inversely affected the caregiver's satisfaction with themselves as the provider of care at 6 months poststroke ( $\beta_6 = -0.32$ ,  $p = 0.002$ ). This indicates that the caregivers who coped more effectively felt less dissatisfied with themselves as caregivers. Further, caregivers' coping ability significantly inversely influenced consequences in their personal lives as a result of providing care at 6 months ( $\beta_6 = -0.44$ ,  $p < 0.0001$ ). That is, at 6 months poststroke, caregivers who coped better experienced significantly fewer negative consequences in their personal lives as a result of the caregiving experience. Finally, the ability to cope also significantly and inversely affected the number of depressive symptoms in the caregiver at 6 months ( $\beta_6 = -0.76$ ,  $p < 0.0001$ ), which indicates that caregivers who cope more effectively experience fewer depressive symptoms at 6 months poststroke.



**Figure 3.**

Path depiction of effects of coping on quality-of-life outcomes for stroke caregivers at 6 months poststroke.

These results support Hypothesis 3: coping influences all QOL outcomes for the caregiver. Coping significantly and inversely affected all outcomes at 1 and 6 months, which indicates that a stronger SOC ameliorates the deleterious effects of caregiving.

We calculated a two-way fixed-effects repeated-measures ANOVA for each dependent measure to compare the  $\beta$  coefficients for each independent variable and time at 1 and 6 months. We estimated these models to determine if the  $\beta$  coefficient changed significantly from 1 to 6 months.

For depressive symptoms, overall burden, satisfaction with the care recipient, and satisfaction with themselves as caregivers, no significant main or interaction effects existed, which indicates that the  $\beta$  coefficients did not differ significantly from 1 to 6 months on the depression, burden, and satisfaction measures for any of the independent variables. However, time did significantly interact with coping ( $p = 0.05$ ). This indicates that the  $\beta$  coefficient of coping on the negative consequences in the personal life of the caregiver at 6 months is significantly more than that at 1 month ( $t = -2.00$ ,  $p = 0.05$ ).

#### Calculation of Indirect Effects

We calculated the indirect effects by multiplying the standardized coefficients ( $\beta$  coefficients) for the stroke survivor and caregiver characteristics on coping (Table 3 and Table 4) by standardized coefficients for coping on QOL outcomes (Table 5). However, the relationship between stroke survivor and caregiver characteristics and SOC was not statistically significant, which indicates that no significant indirect effect of those variables existed through the intervening variable, coping, for QOL outcomes. Therefore, only the direct effects of stroke survivor

and caregiver characteristics and caregiver coping ability were statistically significant influences on QOL outcomes. Thus, the remaining analyses examined the direct effects of each stroke survivor and caregiver characteristic on each QOL outcome at 1 and 6 months.

#### Direct Effects

For the path analyses, we deleted nonsignificant variables from regression models and calculated them again with only the significant variables. **Table 6** displays the significant relationships in the regression models for each dependent variable. These analyses tested the hypotheses that stroke survivor and caregiver characteristics directly influenced QOL for caregivers.

**Stroke Survivor Characteristics.** At 1 and 6 months poststroke, stroke survivor functional status and income level did not predict level of burden, satisfaction with the care recipient, or satisfaction with one's own performance as a caregiver. Stroke survivor functional status has an inverse effect on the negative consequences in the personal life of the caregiver at 1-month ( $\beta_1 = -0.24$ ,  $p = 0.02$ ) and 6 months poststroke ( $\beta_6 = -0.27$ ,  $p = 0.003$ ). This result indicates that

caregivers who provide care for stroke survivors with a higher functional status experience fewer negative consequences in their personal lives as a result of providing care. Stroke survivor functional status also predicts caregiver depression at 1 and 6 months poststroke ( $\beta_1 = -0.21$ ,  $p = 0.003$  and  $\beta_6 = -0.14$ ,  $p = 0.04$ ). That is, caregivers who provide care for individuals with higher functional status experience less depression at 1 month.

**Caregiver Characteristics.** Caregiver burden was predicted by the caregiver's relationship to the stroke survivor. Compared with spouses, nonspouses experienced significantly less overall burden than spouses at 1 month ( $\beta_1 = -0.18$ ,  $p = 0.05$ ).

Satisfaction with the care recipient was significantly predicted by relationship to the stroke survivor when all variables were in the regression model. When only the significant variables were entered into the model, relationship to the stroke survivor became insignificant ( $\beta_1 = -0.10$ ,  $p = 0.30$ ). This result indicates that when other variables are not controlled for, nonspouses do not differ significantly from spouses in terms of satisfaction with the care recipient.

**Table 6.**

Significant relationships ( $F$  test,  $p$ -value, and coefficient of determination [ $R^2$ ]) in regression equations at 1- and 6-months poststroke by dependent variable for influence of stroke survivor and caregiver characteristics on caregiver quality of life.

Time Poststroke	Dependent Variables	$df$	Independent Variables	$F$	$p$ -Value	$R^2$
1 Month	Burden	2,89	Relationship to patient Coping	16.30	<0.0001	0.27
	Dissatisfaction with care recipient	2,89	Coping	9.48	0.0002	0.18
	Dissatisfaction with performance as caregiver	1,90	Coping	28.11	<0.0001	0.24
	Negative consequences in personal life of caregiver	5,86	Patient functional status Caregiver ethnicity Relation to patient Coping	6.43	<0.0001	0.27
	Depression	2,89	Patient functional status Coping	56.80	<0.0001	0.56
6 Months	Burden	1,90	Coping	24.98	<0.0001	0.22
	Dissatisfaction with care recipient	1,90	Coping	18.34	<0.0001	0.17
	Dissatisfaction with performance as caregiver	1,90	Coping	8.30	0.005	0.09
	Negative consequences in personal life of caregiver	4,87	Patient functional status Caregiver ethnicity Coping	11.76	<0.0001	0.35
	Depression	2,89	Patient functional status Coping	60.73	<0.0001	0.58

$df$  = degrees of freedom.

Caregiver characteristics did not significantly predict satisfaction with one's own performance as a caregiver or caregiver depression at 1 or 6 months poststroke. However, caregiver race/ethnicity and relation to stroke survivor did predict consequences of involvement in care for the personal life of the caregiver at 1 and 6 months. Compared with African Americans and Caucasians, Puerto Rican-Hispanics experienced significantly more negative consequences in their life as a result of providing care at 1 month ( $\beta_H = 0.33, p = 0.002$ ) and 6 months poststroke ( $\beta_H = 0.21, p = 0.03$ , where H = Hispanic). Compared with spouses, nonspouses experienced significantly less negative consequences in their personal life as a result of providing care than spouses at 1 month ( $\beta_1 = -0.21, p = 0.03$ ).

## DISCUSSION

These findings offer an interesting and unparalleled insight into the stroke caregiving experience. The data reveal that an individual's SOC, or coping ability, may be quite influential on the caregiving experience.

### Coping Ability

The data in this study did not support the hypothesis that stroke survivor characteristics influence the caregiver's ability to cope at 1 or 6 months. This finding may support the theory that coping ability is a personality trait and is not differentially influenced by a dynamic concept like functional status or a static concept like income. Coping abilities, which are typically thought of as personality traits, are resiliency [43–44], hardiness [45], and SOC [22,46]. Further support is added to this theory by our finding that caregiver characteristics included in the analyses did not influence the coping ability of the caregiver. Race/ethnicity and relationship to the stroke survivor are static concepts that are not changeable. These nonsignificant findings are interesting, particularly from a psychosocial standpoint because they indicate that therapists may not need to differentiate between caregivers based on these factors when they assist caregivers with coping mechanisms. Further, our findings suggest that researchers may not need to differentiate between stroke survivor and caregiver characteristics when they assign caregivers to interventional studies with coping ability as an independent variable. Of course, therapists and researchers need to consider any language differences that may exist when they provide care to individuals from a variety of backgrounds.

Coping ability of the caregiver significantly affected all QOL outcomes for stroke caregivers at both 1 and 6 months poststroke. This indicates that caregivers who positively appraise the situation may adapt better to the caregiving experience and supports previous research [45]. In this study, better coping ability is associated with significantly decreased overall burden, less dissatisfaction with the care recipient, and less dissatisfaction with themselves as caregivers. Also, stroke caregivers who cope effectively experience fewer negative consequences in their personal lives as a result of providing care and also experience less depression. These results may be explained by recognizing that the caregivers in this study had a fairly high SOC at 1 month, which likely buffered the potential deleterious effects of caregiving. This supports previous work that caregivers who have a lower SOC are at a higher risk of caregiving burnout and have increased difficulty coping with the caregiving situation [23]. These results address the importance of assisting caregivers with their coping abilities so that they can decrease the detrimental effects of caregiving.

However, it is particularly interesting that the  $\beta$  coefficient for the time and coping ability interaction was significant, which indicates that the  $\beta$  coefficient at 6 months is significantly less than at 1 month. Since higher scores indicate more effective coping, coping ability decreased significantly over 6 months for this sample. This is an important finding and may indicate a particular time that intervention is needed for caregivers.

### Burden

Overall burden level of the stroke caregiver was predicted by the relationship to the stroke survivor and the coping ability of the stroke caregiver. Nonspouses experienced less overall burden than spousal caregivers at 1 month, but this influence on burden disappeared at 6 months. Therefore, the possibility exists that nonspouses initially feel more challenged by the caregiving situation or the obligation to provide care but by 6 months have adapted or accepted the caregiving role. These findings support previous work that indicates that spousal caregivers experience higher levels of burden than nonspousal caregivers [5–6]. This may be due in part to findings that spousal caregivers may be older, are likely to remain in the caregiving role longer, and are more likely to experience negative consequences as a result of providing care [5].

This study did not support findings that stroke survivor functional status increases stress or strain for the caregiver [47–49]. Previous studies have found that when a change

occurs in the physical, social, or mental function of the stroke survivor, it negatively influences the strain experienced by the caregiver [47]. Our findings are based on data from stroke survivors who have relatively high levels of physical function, which may have influenced these results.

Stroke survivor functional status has an inverse relationship with the caregiver experiencing negative consequences in their personal life as a result of providing care at 1 and 6 months. This is an intuitive predictor because people who are less functionally impaired require less of the caregiver's time, and thus affect the personal life of the caregiver less severely than people who are more functionally impaired. Caregiver characteristics also had significant influence on the negative consequences in the personal lives of caregivers as a result of providing care, which supports previous work [17]. More studies are needed to determine the relationship between functional status of the recipient of care and caregiver burden and coping.

### **Depression**

Caregiver depression is significantly influenced by stroke survivor functional status at 1 and 6 months. That is, caregivers who provide care to individuals who have more functional impairments are likely to experience more depressive symptoms. These findings are consistent with previous studies that found that stroke caregivers are more likely to be depressed when providing care to individuals with more functional impairment [4,27,50–52].

### **Limitations**

This study has a few limitations that should be addressed. First, these data are from caregivers whose care recipients had minimal-to-moderate functional impairment as measured by the FIM motor score, and inclusion in the larger study required a minimum cognitive status score, which would screen out individuals with moderate-to-severe cognitive impairments. Also, these individuals were functional enough to be discharged home, as opposed to a nursing home or long-term care facility. Therefore, these caregivers are providing care to individuals with minimal-to-moderate overall functional impairment who live in the community. Results may be quite different for caregivers who provide care to individuals with severe levels of cognitive or speech impairment and for care recipients who are not residing at home. Further, this study was limited to examination of intrapersonal influences on the caregiving experience; external and environmental influences exist that may also influence QOL for the caregiver. Also, the stroke survivors in this sample were almost all male (99%)

since the participants were from the VA medical care system. Therefore, these data may not represent caregiving for both genders.

### **Implications for Future Research and Practice**

Interventions that target the positive appraisal of stress and coping ability should be implemented and tested for efficacy with stroke caregivers. For clinicians who are assisting caregivers of stroke survivors, coping ability is an important concept to understand and strengthen. This is possible by assisting the caregivers in learning to effectively use the resources and methods available to them to enhance their ability to handle stressful situations. Specifically, clinicians could enhance coping ability and reduce stress by offering caregiving classes, caregiver support groups, and one-on-one interventions that are designed to enhance the caregiver's knowledge and perceived competence. Further, we saw a significant decrease in coping ability from 1 to 6 months. The possibility exists that at 6 months poststroke, caregivers experience a threat to their coping ability. Although this will need to be further substantiated, intervention with caregivers at 6 months may be very beneficial. More studies are needed, however, to determine if coping continues to have a strong impact on QOL outcomes for stroke caregivers at time points beyond 6-months poststroke. Finally, future studies should examine external and environmental influences on QOL for stroke caregivers.

### **CONCLUSION**

We used multivariate techniques to examine the strength of influential variables on the caregiving experience in this study. Coping ability has significant influence on all QOL outcomes we measured. To reduce the negative impact of caregiving, we should target interventions to the coping ability of caregivers. Finally, this study supports the notion that the caregiving experience is multidimensional, because many influences on QOL for stroke caregivers exist.

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